

**HERBERT HOOVER DIKE MAJOR REHABILITATION  
GLADES, HENDRY AND PALM BEACH COUNTIES**

**ENVIRONMENTAL ASSESSMENT  
AND  
PROPOSED FINDING OF NO SIGNIFICANT IMPACT**



**MODIFIED DESIGN IN REACH 1  
AND  
PRIORITY TOE DITCH REPAIRS IN REACHES 1, 2 AND 3**

This page intentionally left blank.

**ENVIRONMENTAL ASSESSMENT  
REACH ONE HERBERT HOOVER DIKE  
MODIFICATIONS TO MAJOR REHABILITATION: TOE DITCH REPAIRS  
PALM BEACH COUNTY, FLORIDA**

**TABLE OF CONTENTS**

<b>LIST OF ACRONYMS .....</b>	<b>IV</b>
<b>1.0 PROJECT PURPOSE AND NEED.....</b>	<b>1</b>
1.1 PROJECT AUTHORITY .....	1
1.2 PROJECT LOCATION .....	2
1.3 PROJECT NEED OR OPPORTUNITY.....	3
1.4 AGENCY OBJECTIVE.....	4
1.5 RELATED ENVIRONMENTAL DOCUMENTS.....	5
1.6 DECISION TO BE MADE.....	5
1.7 PERMITS, LICENSES, AND ENTITLEMENTS .....	5
<b>2.0 ALTERNATIVES .....</b>	<b>7</b>
2.1.1 No Action Alternative.....	7
2.1.2 Alternative No. 1.....	8
2.1.3 Alternative No. 2.....	9
2.1.4 Alternative No. 3.....	10
2.1.5 Alternative No. 4.....	12
2.1.6 Alternative No. 5 (Preferred Alternative) .....	13
2.2 COMPARISON OF ALTERNATIVES.....	26
<b>3.0 AFFECTED ENVIRONMENT.....</b>	<b>27</b>
3.1 INFORMATION.....	27
3.1.1 Wetlands in Reach 1 .....	27
3.1.2 Protected Species .....	27
<b>4.0 ENVIRONMENTAL CONSEQUENCES .....</b>	<b>28</b>
4.1 INTRODUCTION .....	28
4.01 INTRODUCTION .....	28
4.2 THREATENED AND ENDANGERED SPECIES.....	28
4.3 CUMULATIVE IMPACTS.....	35
4.4 IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES .....	36
4.5 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS.....	36
4.6 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG- TERM PRODUCTIVITY .....	38
4.7 INDIRECT EFFECTS .....	38
4.8 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES .....	38
4.9 CONFLICTS AND CONTROVERSY.....	38
4.10 ENVIRONMENTAL COMMITMENTS.....	38
4.11 MITIGATION.....	40
4.12 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS.....	44
4.12.1 National Environmental Policy Act of 1969.....	44
4.12.2 Endangered Species Act of 1973 .....	44
4.12.3 Fish and Wildlife Coordination Act of 1958 .....	44

4.12.4	National Historic Preservation Act of 1966 (Inter Alia).....	44
4.12.5	Clean Water Act of 1972 .....	44
4.12.6	Clean Air Act of 1972.....	44
4.12.7	Coastal Zone Management Act of 1972 .....	45
4.12.8	Farmland Protection Policy Act of 1981 .....	45
4.12.9	Wild and Scenic River Act of 1968 .....	45
4.12.10	Estuary Protection Act of 1968.....	45
4.12.11	Federal Water Project Recreation Act .....	45
4.12.12	Migratory Bird Treaty Act and Migratory Bird Conservation Act.....	45
4.12.13	E.O. 11990, Protection of Wetlands .....	45
4.12.14	E.O. 11988, Flood Plain Management.....	46
4.12.15	E.O. 12898, Environmental Justice.....	46
4.12.16	E.O. 13112, INVASIVE SPECIES .....	46
5.0	LIST OF PREPARERS .....	47
5.1	PREPARERS .....	47
5.2	REVIEWERS.....	47
6.0	PUBLIC INVOLVEMENT .....	48
6.1	SCOPING AND DRAFT EA .....	48
6.2	AGENCY COORDINATION .....	48
6.3	LIST OF RECIPIENTS .....	48
6.4	COMMENTS RECEIVED AND RESPONSE .....	49
	REFERENCES .....	50

## LIST OF FIGURES

Figure 1-1: Project Location Map.....	2
Figure 1-2: Seepage and Management Control in Toe Ditch (1995).....	3
Figure 1-3: Active Seepage and Piping Management in toe ditch (2003).....	4
Figure 2-1: No Action Alternative (Existing Conditions) .....	7
Figure 2-2: Alternative No. 1 .....	8
Figure 2-3: Alternative No. 2.....	9
Figure 2-4: Alternative No. 3.....	11
Figure 2-5: Alternative No. 4.....	12
Figure 2-6: Alternative No.5 (Preferred Alternative) .....	13
Figure 2-7: Priority Areas Identified for immediate repair.....	14
Figure 2-8: Cross section of typical Toe Ditch backfilling with stormwater swale .....	15
Figure 2-9: Aerial view of Priority Areas .....	16
Figure 2-10: Priority Area 0, Sand Cut (6000 ft North of C-10A) .....	17
Figure 2-11: Priority 1 (Sugar Ramp South 1/2 Mile).....	18
Figure 2-12: Priority Area 2 (Rardin Pk to South end of Quarry) .....	19
Figure 2-13: Priority Area 3 (West of S-236).....	20
Figure 2-14: Priority Area 4 - (1/4 Mile North of C-10 for 500 ft) .....	21
Figure 2-15: Priority Area 5 (S-352 South for one mile).....	22
Figure 2-16: Priority Area 6 (Sugar Ramp North a 1/4 Mile) .....	23
Figure 2-17: Priority Area 7 (S-352 North for 1/2 Mile).....	24
Figure 2-18: Priority Area 8 (South of S-351).....	25

Figure 4-1: Pre-Mitigation Conditions at Sportsman's Cove. From C-5A Structure Looking East (Note: australian pine) .....	41
Figure 4-2: Pre-project conditions at Sportsman's Cove Looking East from HHD (north of C-5A Structure.) .....	41
Figure 4-3: Post-Wetlands Restoration - Sportsman's Cove at C-5A, PLANTING Done at Water's Edge. (7-2-2004).....	42
Figure 4-4: Planting of Wetland Vegetation along HHD Borrow Canal Between S-77 and Sportsman's Cove. (6-25-2005) .....	42
Figure 4-5: Planting of Wetland Vegetation along HHD Borrow Canal Between S-77 and Sportsman's Cove. (6-25-2005) .....	43
Figure 4-6: Planting of Wetland Vegetation along HHD Borrow Canal Between S-77 and Sportsman's Cove. (6-25-2005) .....	43

## **LIST OF TABLES**

Table 4-1: Environmental Consequences of the Proposed Alternatives.....	31
Table 4-2: Mitigation Credits Available .....	40
Table 5-1: List of EA Preparers .....	47
Table 5-2: List of EA Reviewers .....	47

## **APPENDICES**

Appendix A – 404(b) Evaluation	
Appendix B – CZMP Evaluation	
Appendix C – Mitigation Assessment	
Appendix D – Pertinent Correspondence	

This page intentionally left blank.

**LIST OF ACRONYMS**

bls	Below Land Surface
BMPs	Best Management Practices
CFR	Code of Federal Regulations
CAR	Coordination Act Report
C&SF	Central and Southern Florida Project
Corps	US Army Corps of Engineers
dB	Decibels
DDR	Draft Design Report
DEIS	Draft Environmental Impact Statement
EAA	Everglades Agricultural Area
EIS	Environmental Impact Statement
EPA	US Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FFWCC	Florida Fish and Wildlife Conservation Commission
FGFWFC	Florida Game and Freshwater Fish Commission
FMSF	Florida Master Site File
FNAI	Florida Natural Areas Inventory
FNST	Florida National Scenic Trail
GLOTA	Greater Lake Okeechobee Tourist Alliance
HHD	Herbert Hoover Dike
HGS	Hurricane Gate Structure
LOST	Lake Okeechobee Scenic Trail
MRR	Major Rehabilitation Report
MWL	Minimum Water Levee
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act of 1966, as amended
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PSD	Prevention of Significant Deterioration

SDEIS	Supplemental Environmental Impact Statement
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Officer
USFWS	United States Fish and Wildlife Service
VE	Value Engineering
WCA	Water Conservation Area



**PROPOSED FINDING OF NO SIGNIFICANT IMPACT  
HERBERT HOOVER DIKE REACH ONE  
PALM BEACH COUNTY, FLORIDA**

Based on the information analyzed in this Environmental Assessment (EA), reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed action will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement (EIS). Reasons for this conclusion are, in summary:

- a. The goal of the rehabilitation of the HHD is to reduce the risk to public safety and health associated with the stability of the dike by implementing the recommended plan. Levee seepage and stability have a direct effect on the capability of the levee to provide authorized protection. The authorization for levee repairs and modifications of The Flood Control Act of 1948 justify the proposed renovation to the HHD.
- b. This EA has been circulated with a draft proposed Finding of No Significant Impact (FONSI) for public and agency review and coordination in compliance with the National Environmental Policy Act. No significant issues were raised regarding project impacts to the natural or human environment.
- c. Impacts to the toe ditch wetlands will be moderate. Although the quality of the wetlands in these man-made ditches is not considered a high quality ecosystem, a variety of wading birds, small fishes and invertebrates utilize the ditches. In the Final EIS for Reach 1 repairs (July 2005), the U.S. Fish and Wildlife Service (USFWS) suggested mitigation measures in the Coordination Act Report (CAR). As a result, the Corps carried out mitigation that is equivalent to 27 habitat units of mitigation credit (p. 24).
- d. Adverse impacts to protected species are not anticipated. There is no critical habitat for listed endangered species along the landward toe of HHD. Listed species that might be observed in the region include wood stork (E), snail kite (E; critical habitat inside HHD in Lake Okeechobee littoral zone), eastern indigo snake (T), bald eagle (T), and Audubon's crested caracara (T). Special measures will be incorporated during project construction to avoid or minimize adverse effects to any listed endangered, threatened, or species of special concern that may be present (see Environmental Commitments, p.39). The U.S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) agree to maintain an open and cooperative informal consultation process with the U.S. Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission throughout the design, construction, and operation of this rehabilitation project. The proposed action is in compliance with the Endangered Species Act.

- e. Minor impacts to fish and wildlife are likely to occur due to implementation of the preferred alternative. The foraging habitat for wading birds in the landward toe ditches would be reduced through implementation of this alternative. This is a minor loss, but considering the low quality of these ditches as foraging habitat, and the availability of an extensive network of comparable ditches in the area, not significant in extent.
- f. The proposed action would occur within the existing Right-of-Way. The Final EIS (July 2005) approved implementation of the selected plan within this area.
- g. The USACE has coordinated a consistency determination under the guideline of the Coastal Zone Management (CZM) Act in the Final EIS, dated July 2005. The State has concurred with the determination (Annex D of the Final EIS, dated July 2005) that the proposed action is consistent with the State's CZM programs. We expect that the modified plan is likewise consistent with the Florida CZM program.
- h. The proposed action has been coordinated with the Florida State Historic Preservation Officer in accordance with the National Historic Preservation Act and the Archeology and Historic Preservation Act. Consultation with the State Historic Preservation Officer (SHPO) was initiated August 20, 1999. In a response dated August 7, 2005, the SHPO concurred with the Corps' no adverse effect determination on Reach 1. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places (p. 41). Conditions to protect undiscovered resources will be implemented as follows: Language will be included in construction contract specifications outlining the steps to be taken in the event that undiscovered historical properties are encountered. An informational training session, developed by a professional archaeologist, will be conducted for the contractor's personnel to explain what kinds of archaeological/cultural materials might be encountered during construction of the impoundment, and the steps to be taken in the event these materials are encountered. A professional archaeologist will conduct periodic monitoring of the project area during construction to determine if activities are impacting unanticipated cultural resources. The proposed action is consistent with these Acts.
- i. In compliance with the Clean Water Act, a water quality certificate will be obtained from the State. All State water quality requirements will be followed.

In view of the above and after consideration of public and agency comments received on the project, I have concluded that the proposed action for the rehabilitation of HHD will not result in a significant adverse effect on the human environment. This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed herewith.

---

Paul L. Grosskruger  
Colonel, U.S. Army  
District Engineer

---

Date

This page intentionally left blank.

## HERBERT HOOVER DIKE DRAFT ENVIRONMENTAL ASSESSMENT

**Proposed Action:** Five alternatives have been proposed to reduce the probability of a breach in Reach 1 of the Herbert Hoover DiKE that surrounds Lake Okeechobee, in Martin and Palm Beach Counties, Florida.

**Type of Statement:** Draft Environmental Assessment

**Lead Agency:** U.S. Army Corps of Engineers

### Summary

The Herbert Hoover DiKE (HHD), built around Lake Okeechobee in south central Florida, was originally constructed as a series of embankments by local interests in 1915 in order to provide flood protection to the surrounding communities and controlled irrigation for local agriculturists. These embankments were improved to the current levee system by the U.S. Army Corps of Engineers (Corps) during the 1930s and 1940s, and major culvert modifications were accomplished in the 1970s. Since then, only as-needed repairs have been made to the HHD. Recent high water events have caused several boils and pipings around the dike, suggesting the need for major rehabilitation. The Corps prepared a HHD Major Rehabilitation Evaluation Report (MRR) and Draft EIS (DEIS) in November 2000. The MRR primarily focused on the development and evaluation of alternatives for the rehabilitation of Reach 1, with the intent to release a supplemental MRR for the remaining Reaches. The design for Reach 1 has been modified since the release of the 2000 MRR due to a number of events, including: implementation of the Value Engineering (VE) study results, which led to preparation and coordination of a Supplemental Draft and Final EIS in 2005. More recently, application of lessons learned from Hurricane Katrina, and consideration of recommendations made from an interdisciplinary team of scientists that conducted an Independent Technical Review (ITR), led to a redesign. The alternatives previously considered are included in this document in a summary format to provide background information. The alternatives under consideration are (1) the No Action alternative, defined as not making improvements to Reach 1 and no physical changes in the study area, and (2) the Preferred Alternative, which includes an impervious cutoff wall at the crest of the dike and a stability seepage berm. The preferred alternative design offers the best technology in the industry to reduce seepage and piping immediately at the most critical areas of the dike as well as to offer stability and protection in the long-term. Based on the analyses of the EA, the implementation of the preferred alternative will beneficially impact the public by increasing safety and health. Mitigated effects are anticipated to the man-made toe ditch wetlands and the associated fish and wildlife that rely on this wetland habitat. The Corps has already undertaken mitigation measures to offset any negative impacts associated with implementation of the selected plan.

This page intentionally left blank.

**ENVIRONMENTAL ASSESSMENT  
FOR  
PRIORITY TOE DITCH REPAIRS, REACH 1, 2 AND 3  
HERBERT HOOVER DIKE  
PALM BEACH COUNTY, FLORIDA**

## **1.0 PROJECT PURPOSE AND NEED**

The Herbert Hoover Dike (HHD) consists of a series of levees, gated culverts and locks that encompass Lake Okeechobee. Construction of this dike began in 1915 as the first embankments around the lake were constructed by local interests and were primarily composed of muck, sand, shell, and marl from adjacent borrow canals. During the 1930s, a Federal interest was initiated as a result of the hurricane tides of 1926 and 1928 overtopping the original embankment and causing over 2,600 deaths. The River and Harbor Act, approved 3 July 1930, authorized the construction of 67.8 miles (109 kilometers (km)) of levee along the south shore of the lake and 15.7 miles (25.3 km) of levee along the north shore. Constructed by the Corps between 1932 and 1938, the typical crest height of these levees ranged from 32 to 35 feet (9.8 meters (m) to 10.7 m) above the National Geodetic Vertical Datum of 1929 (NGVD). A major hurricane in 1947 prompted the need for additional flood protection work in Florida. In response, Congress passed the Flood Control Act of 1948 authorizing the first phase of the comprehensive plan for flood protection and other water control. Additionally, major culvert modifications were accomplished in the 1970s.

In recent years, only as-needed repairs have been made to the HHD. However, signs of instability such as boils and piping areas have occurred during recent years that indicate major renovations are now necessary, especially along the southern portion of the HHD. In 2003, emergency operations to remediate severe piping had been taken along the eastern portion of Reach 2 and sections of Reach 3 (**Figure 1-1**). An unreliable embankment system could allow for a failure of the system to contain lake waters. Such a failure could result in loss of life, property, and habitat.

## **1.1 PROJECT AUTHORITY**

The Herbert Hoover Dike is a component of the Central and Southern Florida (C&SF) Project. The Flood Control Act (Act), approved by Congress on 30 June 1948, authorized the first phase of a comprehensive plan to provide flood protection and other water control benefits in central and south Florida. The Act included measures for improving control of Lake Okeechobee by constructing or modifying the spillways and other structures, and enlarging the Lake Okeechobee levees to provide the intended flood protection, water storage and water supply. Levee seepage and stability have a direct effect on the capability of the levee to provide the authorized protection. The authorization for levee repairs and modifications of the Act of 1948 justify the proposed renovation to Reach 1 of the HHD. Additional authorization for the C&SF Project was authorized in the Flood Control Act of 1954, 1960, 1965, and 1968; the Water Resources Development Acts of 1986, 1988, 1990, 1992, and 1996; and the Rivers and Harbors Act of 1930.

## 1.2 PROJECT LOCATION

The existing HHD system is approximately 143 miles (230 km) long, and comprises five counties: Glades, Hendry, Martin, Okeechobee, and Palm Beach. It is divided into eight segments or “Reaches” for planning purposes. The southeastern segment, Reach 1, is the focus of the present study. Reach 1 is an approximately 22.4 miles (36 km) long segment of the HHD located along the southeast portion of the lake. This segment extends from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade (**Figure 1-1**).

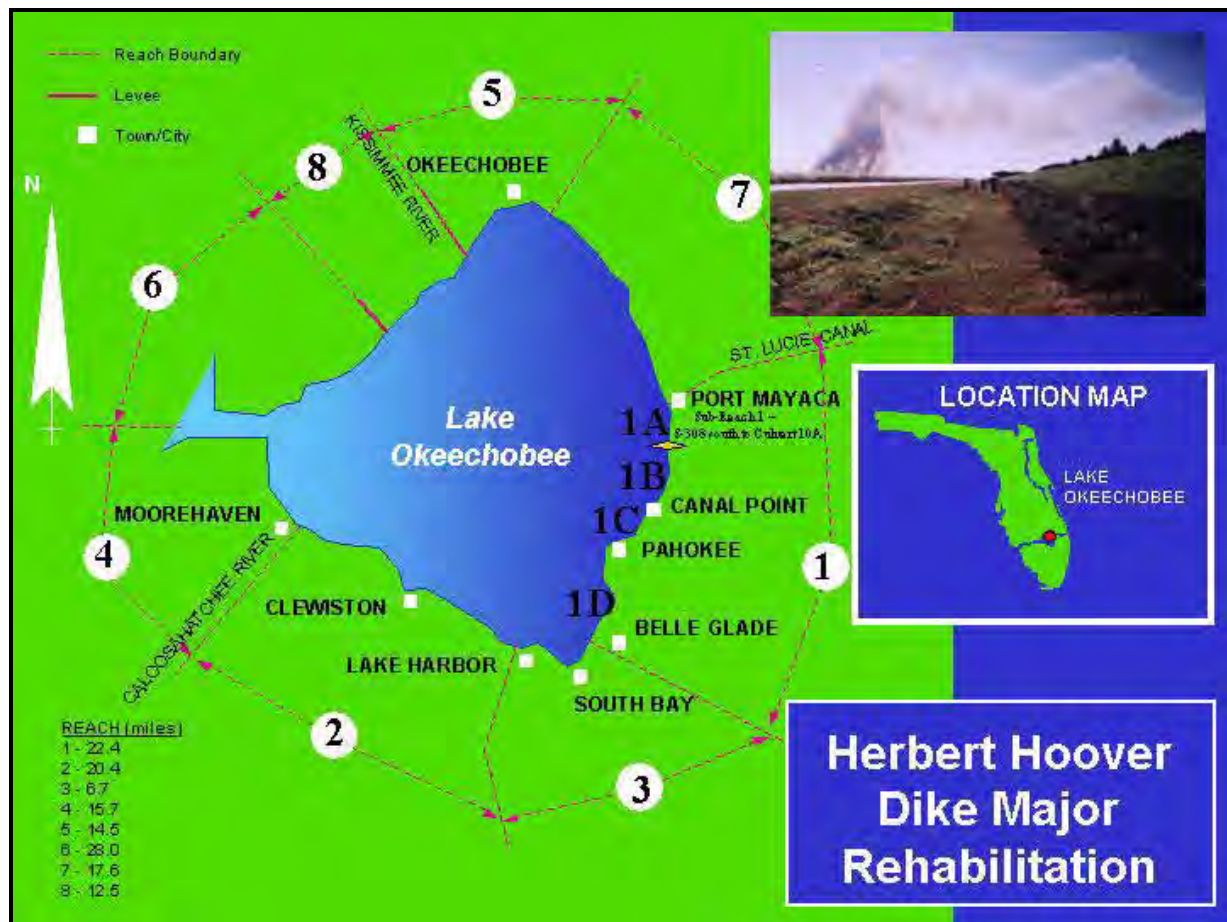


FIGURE 1-1: PROJECT LOCATION MAP



### 1.3 PROJECT NEED OR OPPORTUNITY

The HHD, constructed largely of local material (e.g., mud, muck, sand, shell fragments) and with porous limestone bedrock underlying the levee, has been experiencing a high degree of seepage under and through the levee. This seepage resulted in several boils and piping during the 1995 (**Figure 1-2**) and 1998 high water events. The most significant occurrences were found along Reach 1. Piping and sand boil occurrences have also occurred when there is not a high water event, as shown in **Figure 1-3**. This is an evident concern and demonstrates the need for immediate repair of the dike in the most critical areas.

An unreliable embankment system, such as that which currently exists along Reach 1 of the HHD, could allow for a failure of the system to contain lake waters. Such a failure could result in loss of life, property, and habitat. A reasonable and effective rehabilitative effort is required to eliminate this possibility.



**FIGURE 1-2: SEEPAGE AND MANAGEMENT CONTROL IN TOE DITCH (1995)**



**FIGURE 1-3: ACTIVE SEEPAGE AND PIPING MANAGEMENT IN TOE DITCH (2003)**

#### **1.4 AGENCY OBJECTIVE**

The Corps conducted a structural and stability analysis study on the HHD that culminated in a Major Rehabilitation Report (MRR), dated November 2000 for Reach 1. The general goal of the HHD MRR was to provide a reliable embankment system around Lake Okeechobee to contain the lake waters for flood protection, water supply, and navigation. In July 2002, a Value Engineering (VE) study was completed to further refine the engineering alternatives and attempt to limit the area of environmental impact of the preferred alternative. In addition, emergency repairs and early design documents modified the preferred alternative to further reduce project impacts on wetlands and fish and wildlife habitat. This modification was presented as the preferred alternative (Alternative No. 4) in the “Herbert Hoover Dike Major Rehabilitation Evaluation Report Reach 1, Final Environmental Impact Statement, dated July 2005”. Subsequent to lessons learned from Hurricane Katrina and input from an external, independent team of scientists, the preferred alternative was modified to provide a solution that would immediately address seepage due to piping or internal erosion at the most critical areas of the dike as well as provide a reliable, long-term solution for the rehabilitation of the Dike.

## **1.5 RELATED ENVIRONMENTAL DOCUMENTS**

The following is a list of related NEPA, design and planning documents:

- Final Herbert Hoover Dike Major Rehabilitation Report and Environmental Impact Statement, November 2000.
- Draft and Final Herbert Hoover Dike Major Rehabilitation Evaluation Report, Reach One, Final Environmental Impact Statement, March 2005 and July 2005. The Record of Decision was signed in August 2005.

## **1.6 DECISION TO BE MADE**

This Environmental Assessment will evaluate an additional alternative to the four alternatives evaluated in the above listed Final EIS, dated July 2005 to accomplish levee restoration in Reach 1 of Herbert Hoover Dike. This alternative is similar to an alternative developed in the HHD MRR in 2000, but was not chosen by the State and Federal partners because it required additional and costly acquisition of real estate and may have impacted regional ground water. Subsequent to Hurricane Katrina levee failures the Corps conducted a nationwide dam/levee safety review. This review identified HHD as a “Class 1 – Urgent and Compelling” dam in active failure. This shifted the Corp’s focus to public safety and risk reduction as the number one priority. The Corps convened an interdisciplinary team of scientists to further evaluate the design of the preferred alternative through an Independent Technical Review (ITR). Based on recommendations resulting from the ITR the Project Delivery Team (PDT) modified the design of the preferred alternative as recommended in this EA.

## **1.7 PERMITS, LICENSES, AND ENTITLEMENTS**

Refer also to Section 4.12 Compliance with Environmental Requirements.

The proposed HHD repairs are subject to Section 404 of the Clean Water Act and would require Water Quality Certification from the FDEP. The FDEP has already issued an exemption for Water Quality Certification for work along Reach 1A. The Section 402(b) National Pollutant Discharge Elimination System (NPDES) permit will be required for construction activities that disturb more than 5 acres of land. This permit will be acquired prior to the initiation of construction.

The local Sponsor, South Florida Water Management District (SFWMD), has the responsibility for acquiring all lands and easements for project implementation.

This page intentionally left blank.

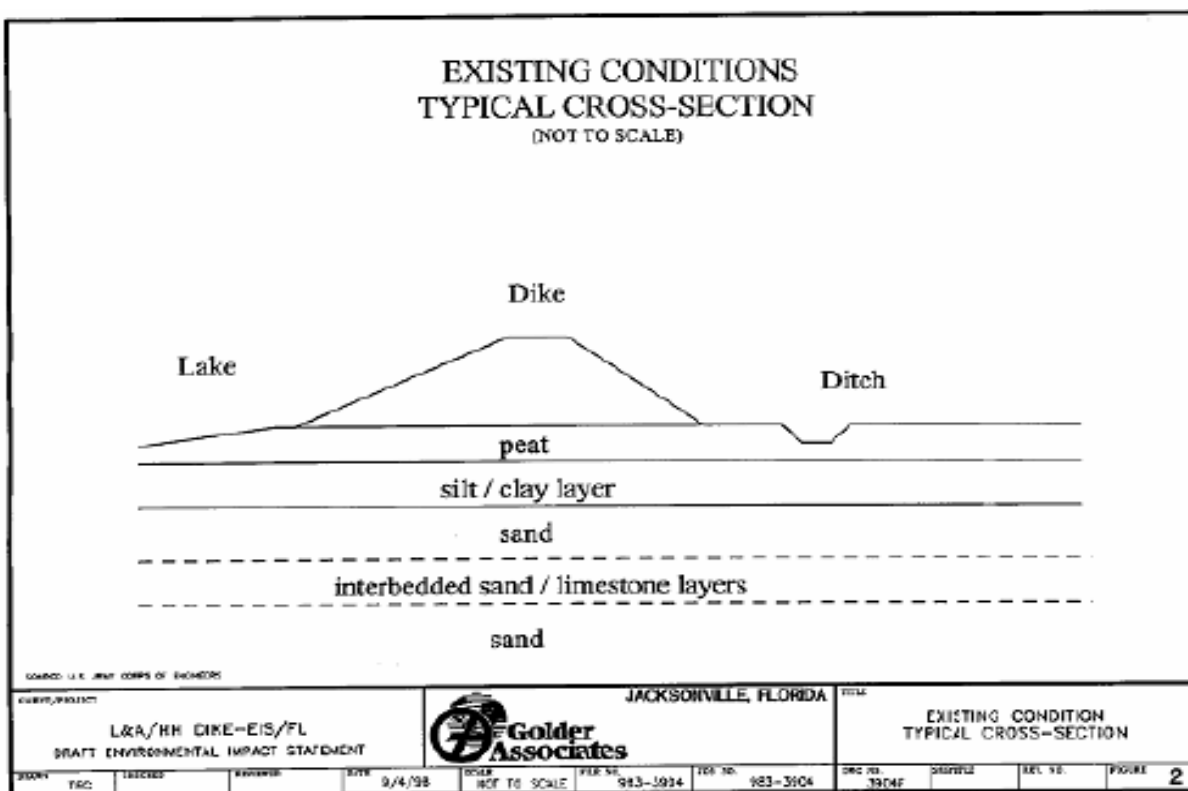
## 2.0 ALTERNATIVES

This section describes the no-action alternative and the current preferred alternative (No. 5). Alternatives No. 1 through No. 4 are also summarized below; they were previously evaluated during the development of Final EIS, dated July 2005, but are no longer under consideration due to the change in focus to public safety and health.

### 2.1.1 No Action Alternative

The No Action Alternative is defined as not taking actions or making physical alterations to improve or repair the HHD within Reach 1. It would maintain the current condition of the dike (**Figure 2-1**). The No Action Alternative would not provide acceptable compliance with current regulation requirements of safety factors relative to dike stability. Without acceptable improvements to the HHD, the safety of the surrounding human and natural environment may be severely impacted with subsequent effects upon the local and regional economies. The continuation of seepage, piping and boils occurring in this area would increase the potential for local flooding due to rainfall and runoff. In the event of a total breach significant impacts to human life, existing soils, vegetation, water resources, habitat, threatened and endangered species, agriculture and property would result.

The No Action Alternative does not provide a long-term solution to the seepage and stability problems existing along Reach 1, 2 and 3.

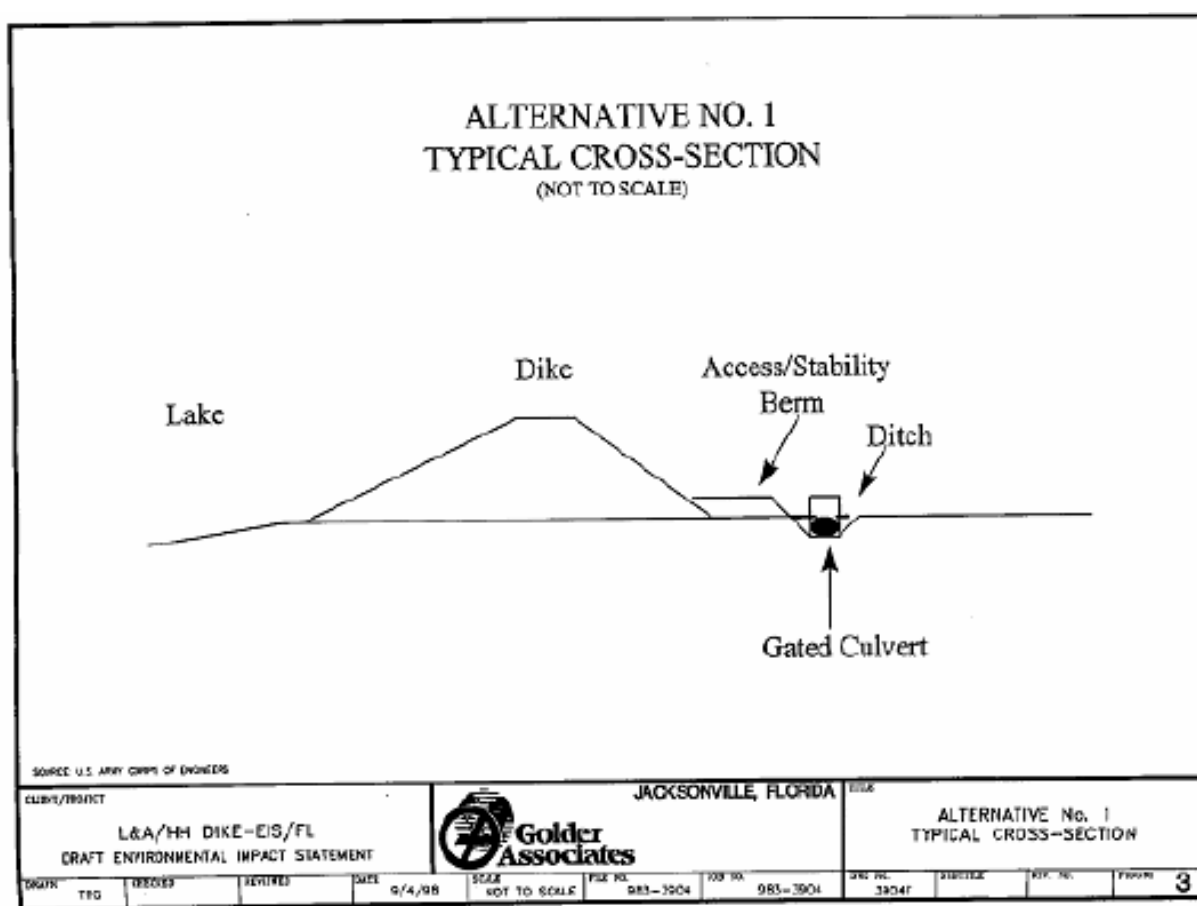


**FIGURE 2-1: NO ACTION ALTERNATIVE (EXISTING CONDITIONS)**

### 2.1.2 Alternative No. 1

This alternative includes increasing the water level in the drainage ditches and the construction of a stability berm at the landside toe of the levee (**Figure 2-2**). Alternative No. 1 would improve the existing drainage ditches by cleaning out the ditches and re-grading the ditches. Culverts with automatic/manual gates and pumps would be installed to control the water level in the ditches. During critical high water periods, the water level in the ditches would be raised in order to limit the differential head across the levee. Raising the water levels in the ditches would increase the local flooding potential due to rainfall and runoff. Presently, local drainage districts and farmers control most of these ditches.

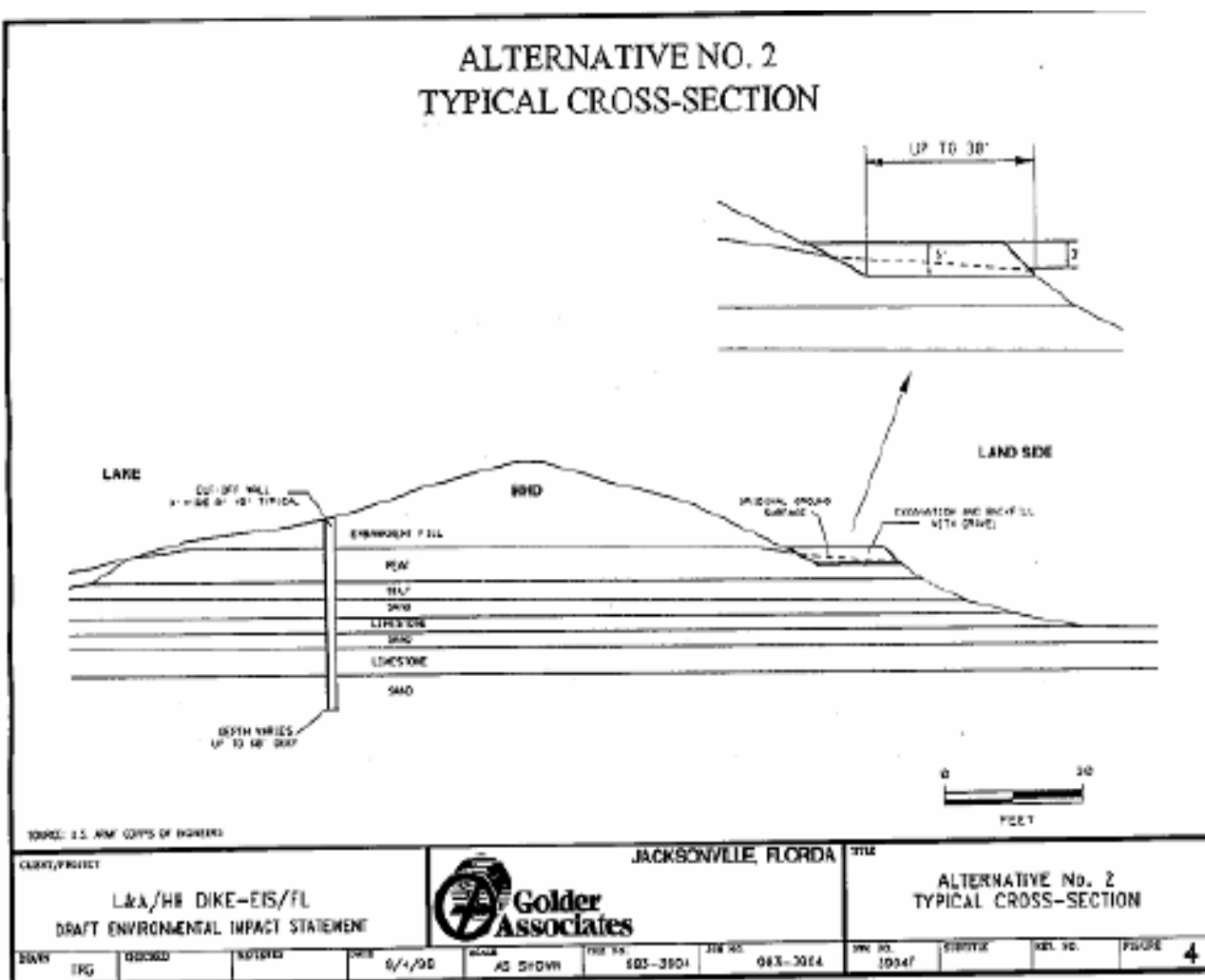
This alternative does not provide adequate protection from the seepage and stability problems that threaten critical areas of the HHD.



**FIGURE 2-2: ALTERNATIVE NO. 1**

### 2.1.3 Alternative No. 2

Alternative No. 2 involves an upstream (lakeside) impervious cutoff wall and a landside stability berm at the toe of the levee (**Figure 2-3**). The cutoff wall would impede groundwater flow. This is the most positive method of underseepage control because it reduces both uplift pressure and through seepage. The wall would consist of a 3 ft (0.9 m) wide, 60 ft (18 m) deep excavation filled with soil-bentonite or soil-cement mixture. The top of the wall would be at an approximate elevation of 25 ft (7.6 m). The cutoff wall would affect the upper aquifer and may lower the groundwater table, thereby affecting local adjacent farms. A landside stability berm as described in Alternative No. 1 would also be constructed. Due to the intensive construction effort, costs, and the effects of the cutoff wall to the local groundwater regime, this action was not selected as the preferred alternative at time the FEIS was produced.



**FIGURE 2-3: ALTERNATIVE NO. 2**

### 2.1.4 Alternative No. 3

Alternative No. 3 includes the installation of a seepage berm with a relief trench and a french drain system along the landward toe of the HHD (**Figure 2-4**). In areas where the HHD toe rests on a peat layer, construction of the seepage berm would begin with excavation of peat material from the landside toe. No excavation would be performed at higher elevations of the embankment slope.

The seepage berm would be constructed along the lower portion of the embankment toe. In areas where a toe ditch now exists, the ditch would be replaced by the proposed seepage berm. The landward side of the berm would contain perforated culvert. A deep relief trench would be excavated immediately below the culvert within the toe ditch and along its entire length. The berm would prevent the piping of sands and silts from the embankment and its foundation. The relief trench is designed to control uplift pressures and prevent seepage and piping flows from extending landward of the embankment. The perforated culvert system would collect and convey seepage flows to controlled outlets that empty into existing drainage canals. A drainage swale would also be constructed along the landward toe of the berm to collect and convey surface drainage from each side of the drainage berm.

Implementation of Alternative No. 3 would improve slope stability and seepage control. However, in emergency implementation of this alternative on a one-mile stretch of Reach 1, the design demonstrated lack of ability to control seepage that would resurface on adjacent properties. Therefore, this alternative has not been selected. In addition, this alternative would require additional real estate acquirement, and have wetlands impacts and effects to fish and wildlife resources.



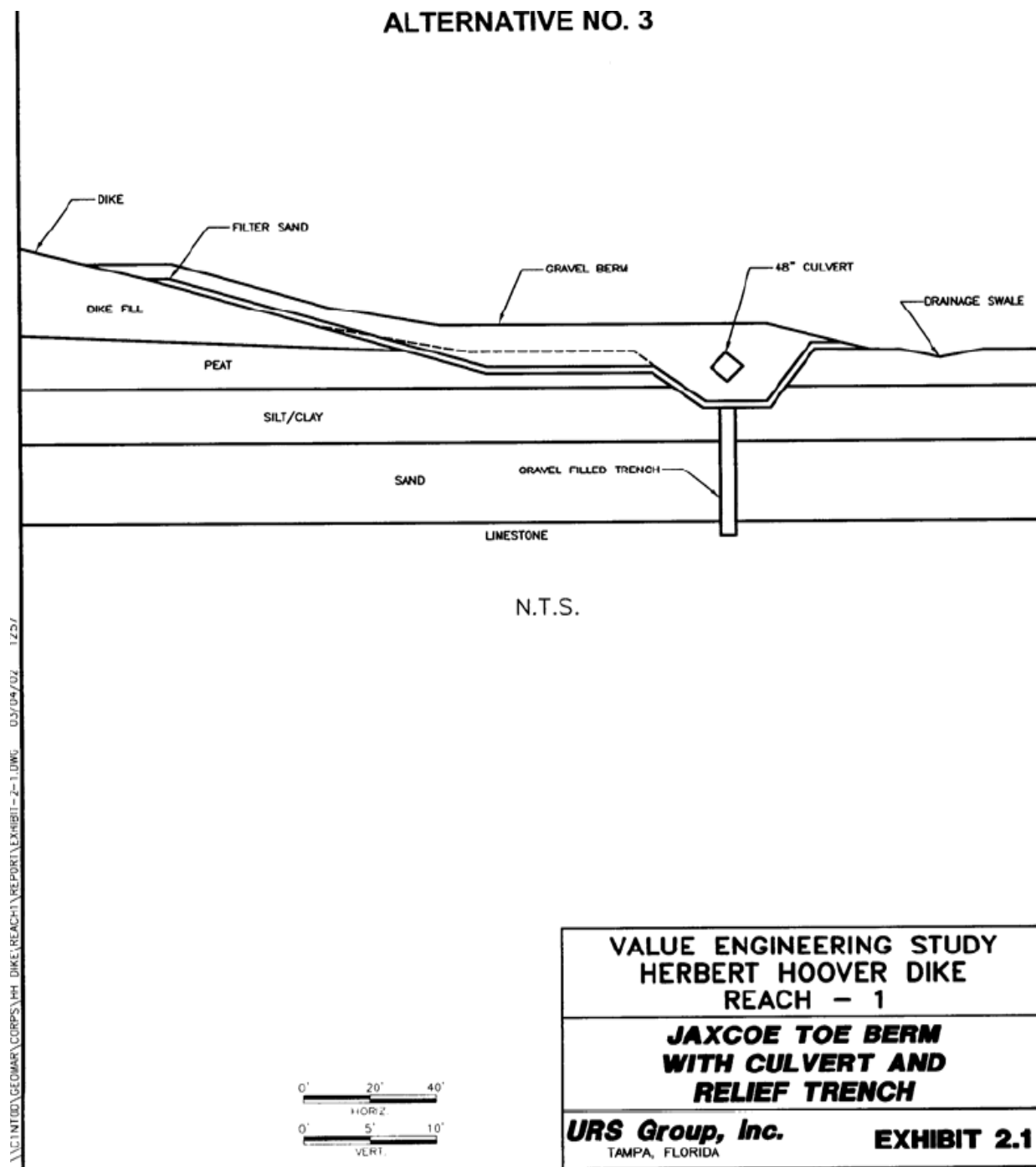
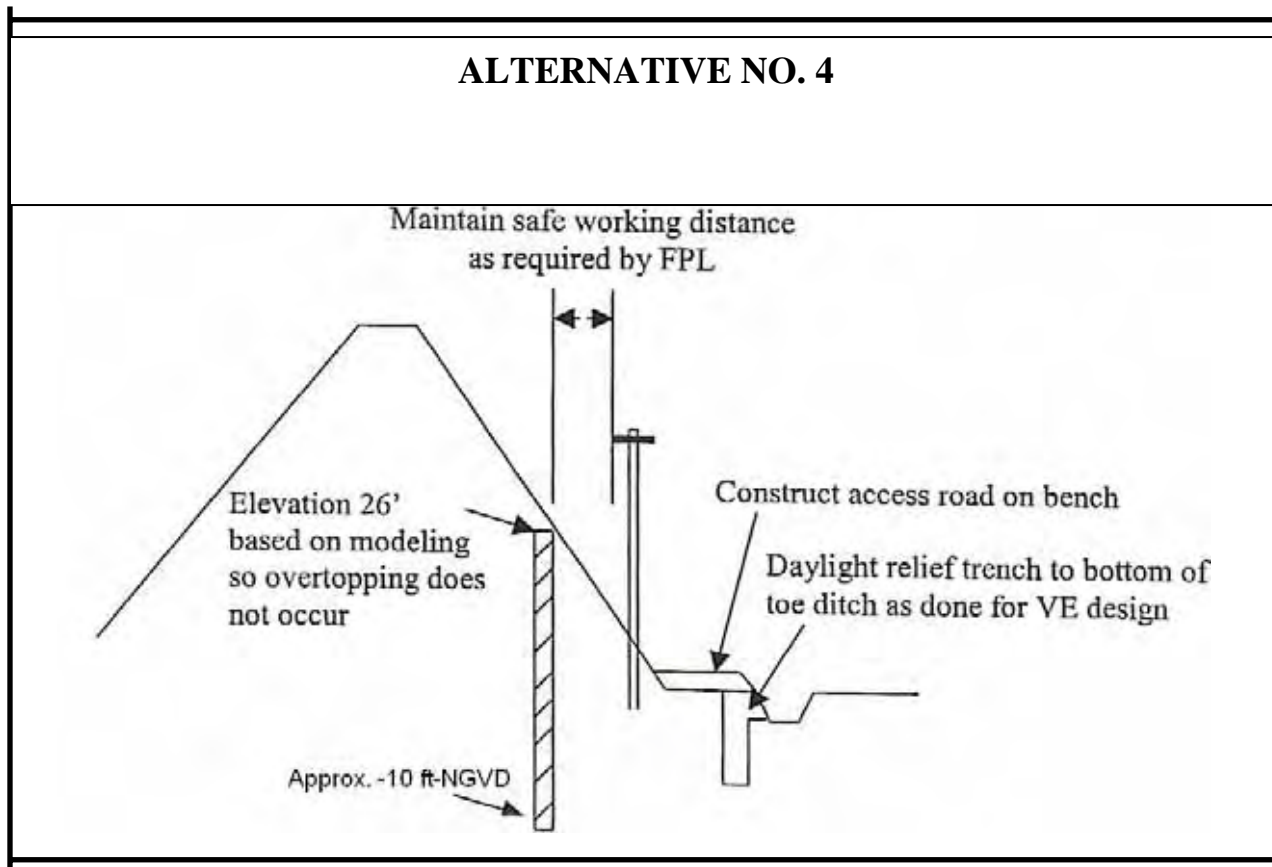


FIGURE 2-4: ALTERNATIVE NO. 3

### 2.1.5 Alternative No. 4

Alternative No. 4 was the preferred alternative of the FEIS, dated July 2005. The design included a hanging seepage cutoff wall on the landward side of the dike slope and a relief trench with an inverted filter and relief berm at the toe of the landward slope of the dike, stopping at the HHD's toe ditch. The relief trench and inverted filter would be constructed adjacent to the existing toe ditch and within the HHD footprint at the landward toe. An access road would be built on top of the relief trench. The plan is similar to the MRR solution Alternative No. 3, but would not contain a closed conduit as outlined in the MRR and utilizes the hanging cut-off wall to prevent piping. The closed conduit would be replaced with the existing open toe ditch for removal of seepage. Seepage water from the seepage toe berm and relief trench would flow freely into the existing toe ditch. The toe ditch geometry may have to be altered on the lakeward side of the ditch due to construction of the trench and drain system. The final design would insure no negative impact on flood control. The initial (2005) decision to select this alternative was based on its relatively lower overall cost, and the belief, at the time the decision was made, that the selected plan provided adequate margins of safety and protection from dike failure. Recent reviews of dike safety, both external and internal to the Corps, coupled with experiences and lessons learned in the aftermath of Hurricane Katrina, have led the Corps to re-evaluate the margin of safety required and re-evaluate the overall plan, leading to recommendations for further reinforcements of Reach 1 (see Alternative 5).

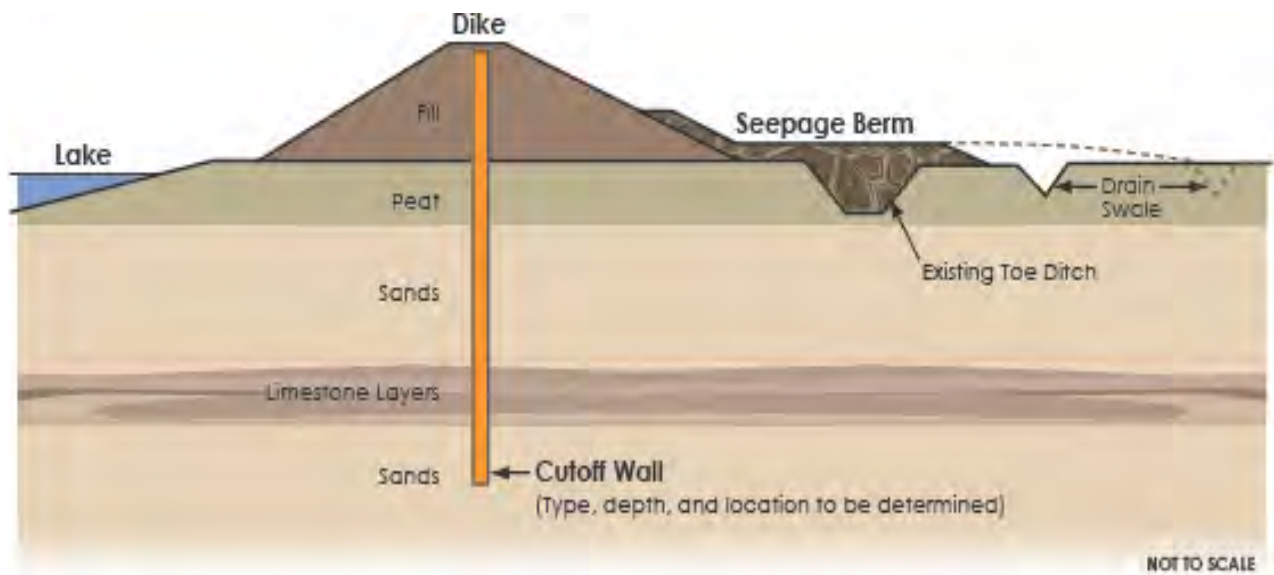


**FIGURE 2-5: ALTERNATIVE NO. 4**

### 2.1.6 Alternative No. 5 (Preferred Alternative)

Alternative No. 5 is the preferred alternative (**Figure 2-6**). Previously, the local sponsor requested that the preferred alternative design be within the existing ROW, this resulted in a less robust design (Alternative No 4). Shift of focus to public safety, and technical concerns related to the previous design, led the Corps to re-evaluate the need for a more robust and redundant plan. This plan will be more costly than the previously selected alternative, but it will provide greater stability and control of seepage and boils.

The design consists of a landside seepage berm and cutoff wall to provide protection at the toe of the dike, to increase stability, and reduce seepage. Since the seepage berm is relatively easy to construct, reliable, and a separable element it can be implemented immediately in the most critical areas of the dike where adequate space is available. At the conceptual level, the seepage berm will extend approximately 150 ft from the toe of the dike. This EA is evaluating environmental effects of the seepage berm within the existing ROW. A future EIS will be produced to assess the effects of the seepage berm outside the existing ROW. The landward side of the berm would contain perforated culvert. The perforated culvert system would collect and convey seepage flows to controlled outlets that empty into existing drainage canals. A drainage swale would also be constructed along the landward toe of the berm to collect and convey surface drainage from each side of the seepage berm. An impermeable cut-off wall will be implemented at the crest of the dike and extend approximately 10 feet below the first limestone layer. The cut off wall will provide resiliency against seepage caused by piping and groundwater flow. The width of the wall will be 2 feet. The cut-off wall material will be decided after the plans and specifications are prepared.

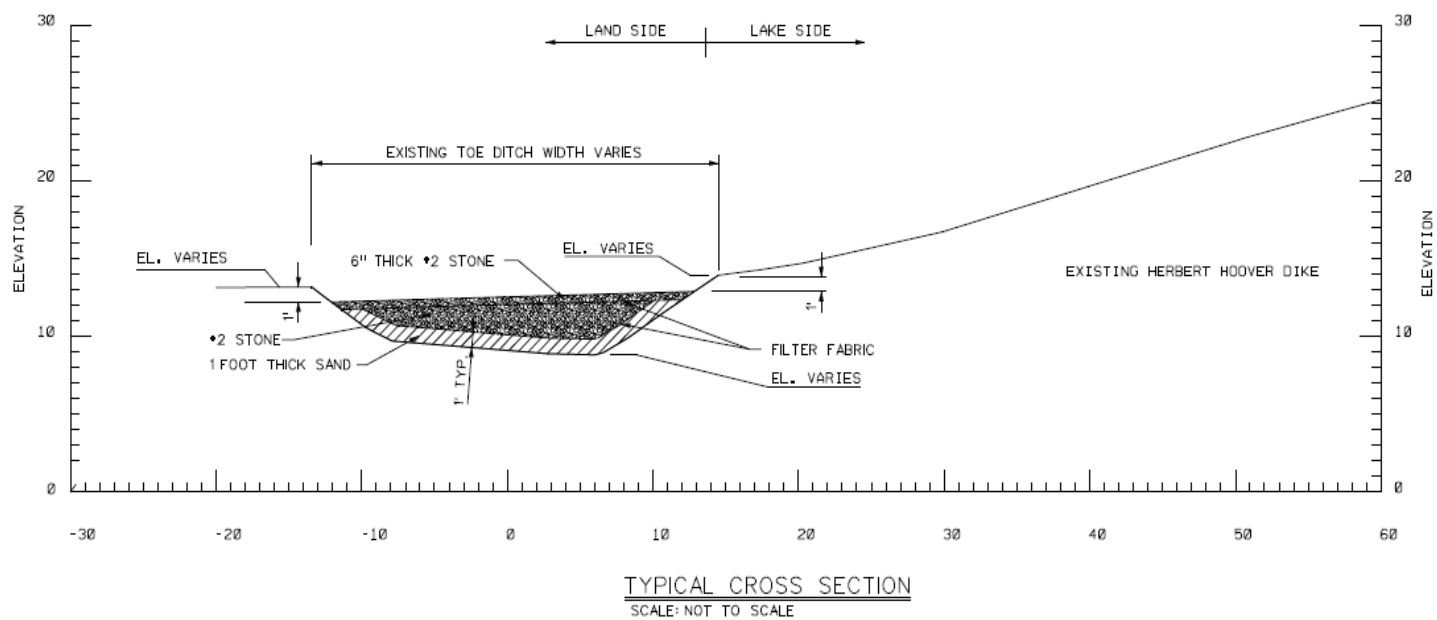


**FIGURE 2-6: ALTERNATIVE NO.5 (PREFERRED ALTERNATIVE)**

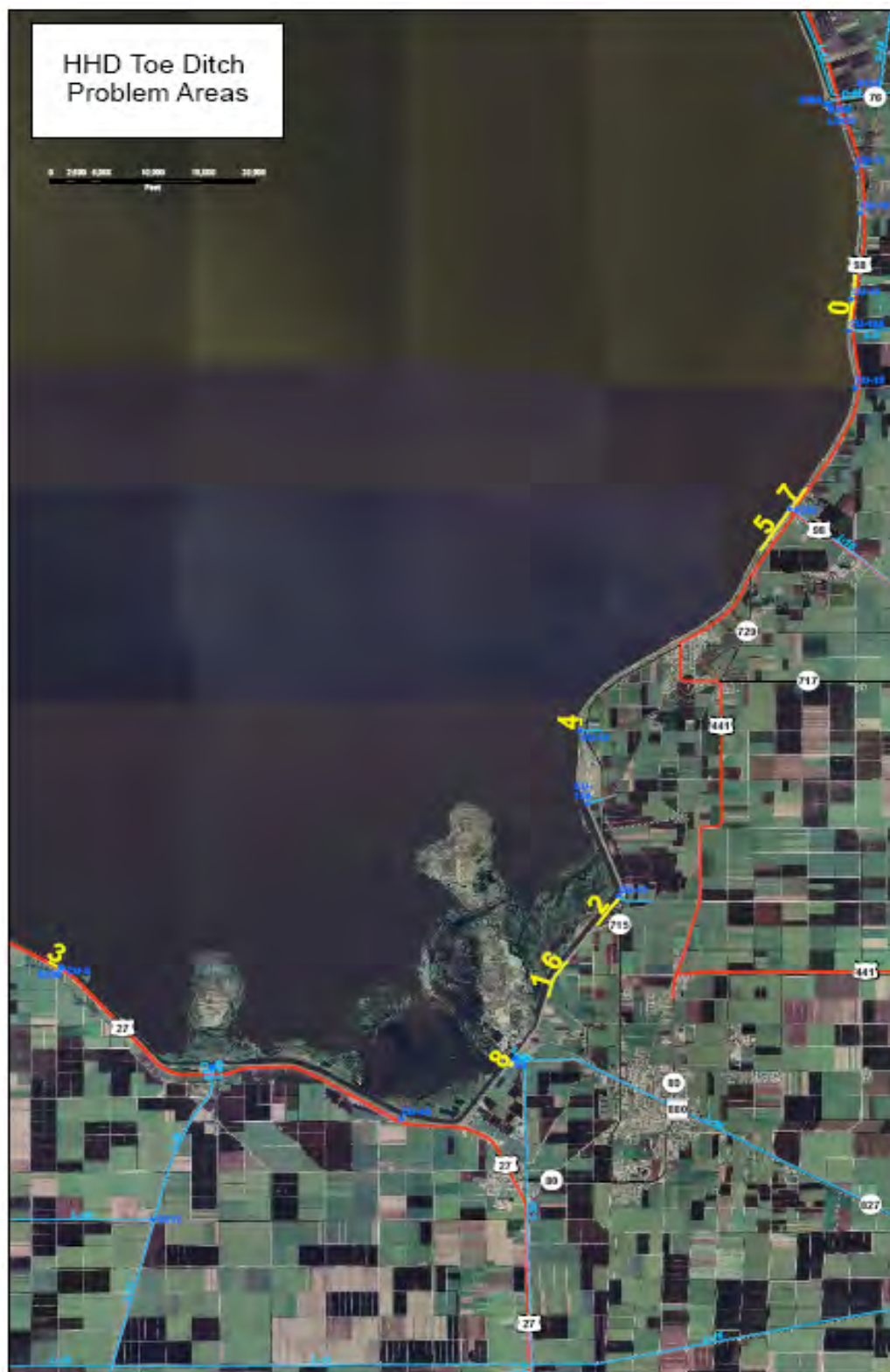
In an effort to expedite the rehabilitation of HHD, the Corps has identified nine priority areas P-0 (highest priority) through P-8 (lowest priority) where immediate repairs can be implemented (**Figure 2-7 and Figure 2-9**). These areas were identified based on possible decreased factors of safety of the levee in these areas attributable to continual seepage boils during high water conditions in the lake (above 15 ft NGVD). Six priority areas are located in Reach 1. Immediate stability can be provided to the dike by backfilling the toe ditch at the priority areas that are within the existing ROW (P-0, a portion of P-1, P-3, P-4, P-5, and P-7). P-6 and a portion of P-1 require additional land acquisition. These portions, along with any additional land acquisition areas needed for the 150 ft seepage berm delineation (from the toe of the dike) will be covered in a later NEPA document when the exact footprint is identified. Priority area P-2 is borrow pit and requires a different fix that will not be evaluated in this EA. Although P-3 and P-8 are located in Reaches 2 and 3, they are considered part of this alternative only for toe ditch repairs because they are urgent areas in need of immediate attention. A more comprehensive plan for the entirety of Reaches 2 and 3 will be released in the subsequent Supplemental MRR and EIS. The priority areas can be stabilized immediately by backfilling the toe ditch with sand and gravel (**Figure 2-8**). The design of the swale is based on capturing 1" of rainfall over an average width of 100 ft of levee backslope. The swale will be temporary until the full toe seepage berm is implemented in these priority areas. Repairs in the priority areas within the existing ROW will equate to approximately 6.0 acres of toe ditch backfilled. Aerial views of the priority areas in Reaches 1, 2, and 3 are provided below as listed: P-0 (Figure 2-10), P-1 (Figure 2-11), P-2 (Figure 2-12), P-3 (Figure 2-13), P-4 (Figure 2-14), P-5 (Figure 2-15), P-6 (Figure 2-16), and P-7 (Figure 2-17), P-8 (Figure 2-18).



**FIGURE 2-7: PRIORITY AREAS IDENTIFIED FOR IMMEDIATE REPAIR  
(NUMBERS WITHIN CIRCLES INDICATE THE “REACHES” OF THE DIKE)**



**FIGURE 2-8: CROSS SECTION OF TYPICAL TOE DITCH BACKFILLING**

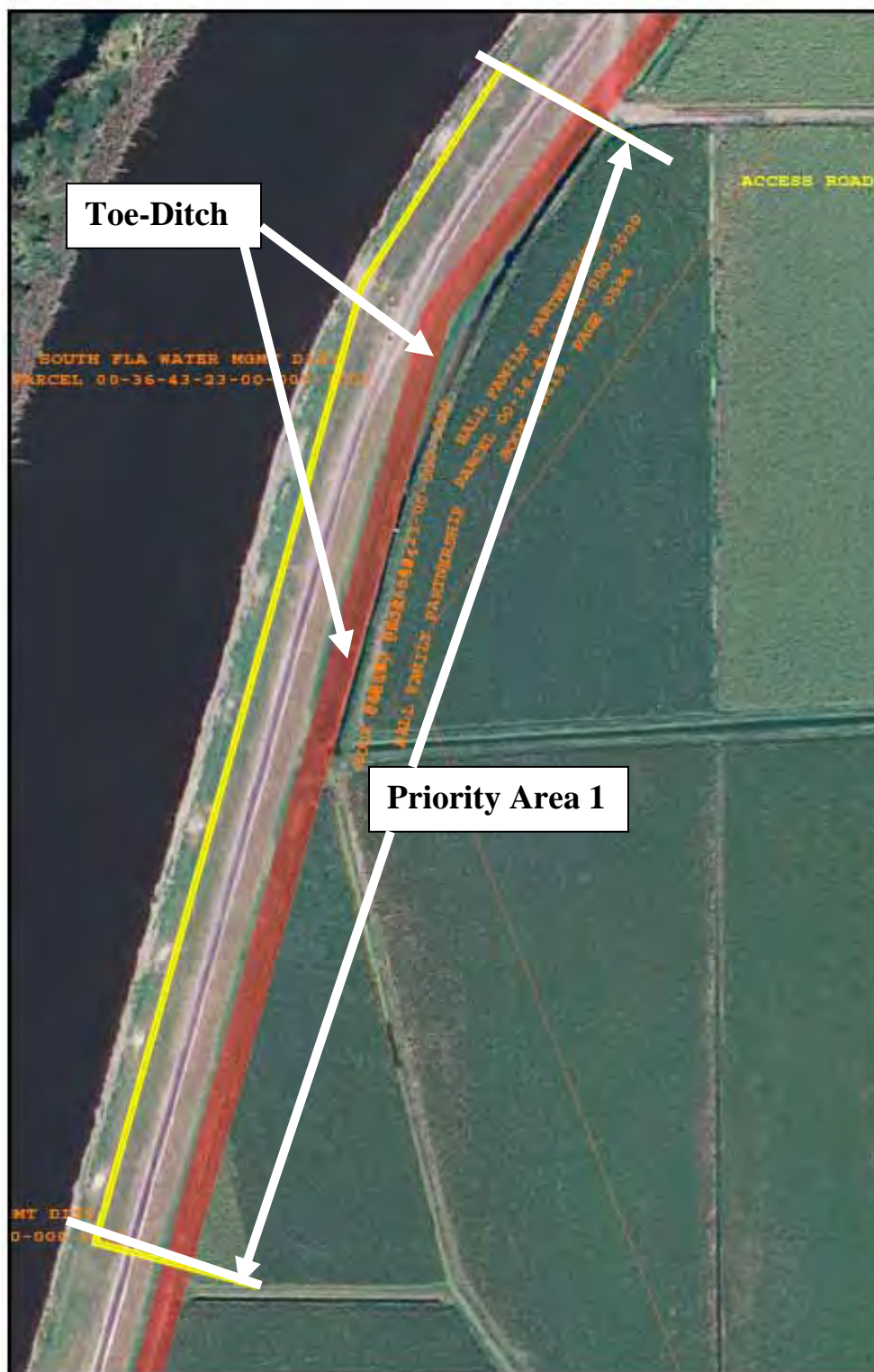


**FIGURE 2-9: AERIAL VIEW OF PRIORITY AREAS**





**FIGURE 2-10: PRIORITY AREA 0, SAND CUT (6000 FT NORTH OF C-10A)**



**FIGURE 2-11: PRIORITY 1 (SUGAR RAMP SOUTH 1/2 MILE)**





**FIGURE 2-12: PRIORITY AREA 2 (RARDIN PK TO SOUTH END OF QUARRY)**



**FIGURE 2-13: PRIORITY AREA 3 (WEST OF S-236)**



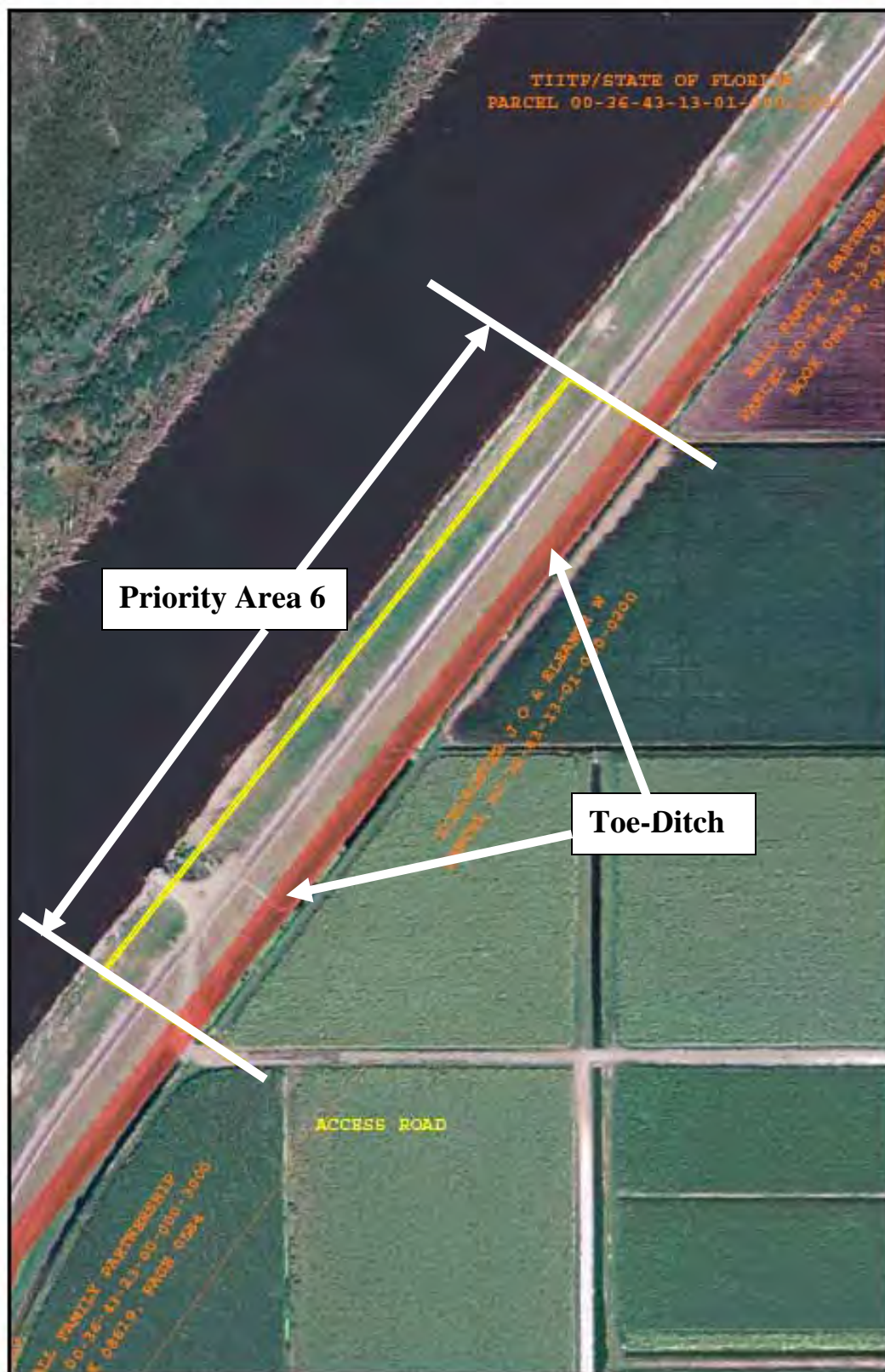


December 2006



**FIGURE 2-15: PRIORITY AREA 5 (S-352 SOUTH FOR ONE MILE)**





**FIGURE 2-16: PRIORITY AREA 6 (SUGAR RAMP NORTH A 1/4 MILE)**



**FIGURE 2-17: PRIORITY AREA 7 (S-352 NORTH FOR 1/2 MILE)**





**FIGURE 2-18: PRIORITY AREA 8 (SOUTH OF S-351)**

## **2.2 COMPARISON OF ALTERNATIVES**

Table 4-1 lists the alternatives under consideration and summarizes the major features and consequences of each of them. See Section 4.0 Environmental Consequences for a more detailed discussion of impacts of alternatives.



### **3.0 AFFECTED ENVIRONMENT**

#### **3.1 INFORMATION**

The wetlands environment in Reach 1 and associated protected species is discussed below; it is anticipated that the majority of impacts from this project will be isolated in this area. A more comprehensive, detailed discussion of the Reach 1 environment can be referenced in the “Herbert Hoover Dike Major Rehabilitation Evaluation Report, Final Environmental Impact Statement”, dated July 2005. Section 3.0 of the FEIS report describes the environment surrounding Reach 1 of the HHD and Lake Okeechobee as it currently exists. Environmental components include physical, biological, social, and economic resources. This Section does not present effects, but puts forth the baseline environment for comparisons in Section 4.0 - Environmental Consequences.

##### **3.1.1 Wetlands in Reach 1**

On the landward side of Reach 1, remaining wetlands are typically found along ditches or low lying areas and are usually a result of impoundment rather than natural hydrology. The majority of these are small, isolated freshwater wetlands located in the northern portion of Reach 1 within the strip of land between the HHD and the transportation corridor (Hwy. 98/441 and the Florida East Coast Railroad). Typical vegetation in these wetlands includes Carolina willow, water hyacinth, cattails, water lettuce, and duckweed (*Lemna sp.*). Along the toe ditch of the HHD, there are a number of places where impoundment of water also occurs. These impoundments are typically small areas occupying less than one hectare (2.47 acre) and host a similar set of hydrophilic vegetation.

Although wetlands present on the landward side of Reach 1 may not be considered high quality ecosystems, they do host small fishes and invertebrates and provide usable foraging habitat for wading birds, alligators, and turtles. A team of biologists from the USACE and USFWS completed a Wetlands Rapid Assessment Procedure (WRAP) to determine the value of the wetlands habitat within Reach 1. Applying the results of the WRAP analysis, the wetlands tree planting produced 1 credit habitat units of mitigation credit would be necessary for the priority toe ditch repairs in Reaches 1-3.

##### **3.1.2 Protected Species**

There is no critical habitat for listed endangered species along the outer toe of HHD. Listed species that might be observed in the region include wood stork (E=endangered), snail kite (E; critical habitat inside HHD in Lake Okeechobee littoral zone), eastern indigo snake, bald eagle, and Audubon’s crested caracara. The burrowing owl, a state listed species of special concern, may also be present.

This page intentionally left blank.

## 4.0 ENVIRONMENTAL CONSEQUENCES

### 4.1 INTRODUCTION

This section discusses potential impacts to the existing environment, including direct, indirect, and cumulative effects that may result from implementation of the proposed Preferred Alternative compared to the No Action alternative. Assessment of the No Action Alternative includes an increased probability of unsatisfactory performance of the dike system, or possible dike failure. Assessment of the Alternative No. 5 involves impacts associated with construction and utilization of Alt No. 5 on the existing environment. A summary of environmental consequences is displayed in Table 4-1.

### 4.2 THREATENED AND ENDANGERED SPECIES

#### **American alligator**

*Alligator mississippiensis*

##### **No Action Alternative**

The American alligator should incur only minimal short-term impacts in the event of a dike failure both waterward and landward of the HHD. Flexibility in habitat usage and mobility should allow this animal to survive in the Lake Okeechobee region even in the event of major water level drop. If a dike failure should occur during nesting season, the impacts waterward should be minimal since water levels are not expected to decrease significantly during such an event. However, the potential for impacting nests landward of the dike exists in the immediate vicinity of a breach.

##### **Alternative No. 5**

Impacts to the American alligator resulting from implementing Alternative No. 5 would be minimal to moderate. Any impacts would be limited to the immediate area of construction.

#### **Eastern Indigo Snake**

*Drymarchon corais couperi*

##### **No Action Alternative**

The indigo snake would likely only be affected minimally in the event of a dike failure. Low utilization of areas waterward of the HHD, would limit potential impacts. The levee itself provides useable habitat for the indigo snake, but a dike failure would only directly affect animals in the immediate vicinity. Landward, this animal is rarely observed due to sub-optimal habitat. Any impacts would be minimal, and only in the immediate area of the dike failure.

##### **Alternative No. 5**

Impacts to the indigo snake resulting from implementing Alternative No. 5 would be minimal to moderate, and limited to the immediate area of construction. Considering the quality of existing habitat for the eastern indigo snake along the lower third of the HHD, construction impacts may occur, but impacts to snakes will be mitigated by proper implementation of an environmental protection plan (see Section 4.10 Environmental Commitments).

**Bald Eagle***Haliaeetus leucocephalus***No Action Alternative**

The slightly lower water levels resulting from a dike failure should impact the bald eagle to a minimal extent. The expected decrease in water level is too minor to significantly affect its foraging activities around the lake.

**Alternative No. 5**

Impacts to the bald eagle resulting from implementing Alternative No. 5 are expected to be minimal. However, the existence of an active bald eagle nest could alter construction plans. An active nest within 1500 ft (457 m) of the HHD would restrict construction activities during nesting season. Surveys for active bald eagle nests would be conducted prior to construction. Bald eagle nesting areas would be subject to USFWS Nesting Protection Measures, where applicable.

Implementation of the selected alternative should not have any significant impacts to the bald eagle along the remaining reaches of the HHD.

**Wood Stork***Mycteria americana***No Action Alternative**

Impacts to the wood stork in the event of a dike failure would be minimal. Slightly lower lake levels could result in slightly less foraging habitat around the lake. Any nesting colonies could be deserted if de-watered at a critical nesting time during the year; however, reduction in lake level due to breaching would be minimal.

**Alternative No. 5**

Impacts to the wood stork resulting from implementing Alternative No. 5 would be minimal to moderate. The wood stork could potentially utilize the toe ditch and adjacent wetlands for foraging activities.

**Everglade Snail Kite***Rostrhamus sociabilis plumbeus***No Action Alternative**

Impacts to the snail kite's significant habitat around Lake Okeechobee would be minimal if there should be a major dike failure. The water level must be sufficiently stable to prevent loss of the apple snail through drying out of the surface. Water loss in this area, in the event of a dike failure would not be great enough to seriously affect successful foraging of the highly mobile snail kite.

**Alternative No. 5**

Impacts to the snail kite resulting from implementing this alternative would be minimal, and restricted to the immediate area of construction. Construction activities would be limited to the

levee itself and the landward side of the levee where this animal doesn't forage extensively. Aside from temporal disturbance caused by the operation of heavy equipment, no impact is expected waterward either. Due to the relatively narrow littoral zone, this area provides minimal snail kite foraging habitat, so impacts are unlikely.

**West Indian Manatee**

Trichechus manatus

**No Action Alternative**

Minimal impacts to the manatee are expected to occur in the event of a dike failure. Expected water level reductions would not be great enough to affect the animal's food supplies or exposure to boat-related injury or death.

**Alternative No. 5**

Impacts to manatee resulting from implementing this alternative would be minimal to none. Construction activities would be limited to the levee itself and the landward side where this animal does not occur.

**Okeechobee Gourd**

Curbita okeechobeensis *o.*

**No Action Alternative**

Okeechobee gourd plants that are currently known to exist in the Lake Okeechobee region are limited to the shores of the lake inside of the HHD. Slightly lower lake levels resulting from a major dike failure would have minimal impact to the existing Okeechobee gourd population in this area. However, given its limited range and habitat requirements, any alteration in the hydrology where this plant currently exists could significantly damage the population. Impacts to these gourds would most likely occur with sustained high water events, rather than low.

**Alternatives No. 5**

Implementation of this alternative would not likely cause impacts to the Okeechobee gourd. The occurrence of this plant along the landward extent of Reach One has not been recorded in recent years.

**TABLE 4-1: ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVES**

ENVIRONMENTAL FACTOR	NO ACTION ALT	ALT NO. 5 (PREFERRED ALT)
THREATENED AND ENDANGERED SPECIES	No significant impacts to protected species expected.	No significant impacts to protected species are expected. Memoranda from field analyses document that soils in the lower levee toe are frequently saturated with water and do not provide adequate burrowing habitat for burrowing owls or indigo snakes. Specifics on monitoring of endangered species are detailed under Section 4.10 - Environmental Commitments.
FISH AND WILDLIFE RESOURCES	The implications to fish and wildlife landward of the HHD that may result from dike failure would be limited to the areas of the breach and surrounding habitats. In the area of Reach 1, fish and wildlife habitat is marginal. However, those animals most significantly affected by extensive flooding include those with limited mobility. Amphibians, reptiles, and small mammals would be impacted to a moderate degree.	Cutoff wall may reduce water supply altering wildlife habitat outside the project area. Existing toe ditch will be converted to seepage berm. This activity would eliminate the foraging habitat to wading birds, reptiles, and amphibians, along the toe ditch. Mitigation to replace habitat would be required.

ENVIRONMENTAL FACTOR	NO ACTION ALT	ALT NO. 5 (PREFERRED ALT)
WETLANDS	<p>Selection of the No Action Alternative would lead to minimal wetland impacts if there should be a failure of the HHD system. These impacts would result from increased water levels due to flooding landward of the HHD.</p>	<p>Wetland impacts resulting from implementation of Alternative No. 5 would be moderate. This alternative involves construction of a cutoff wall and seepage berm. The backfilling of the toe ditch and creation of a seepage berm would eliminate the foraging potential along these ditches. Although these areas provide less than optimal habitat, a variety of wading birds, small fishes and invertebrates utilize the ditches. Impacts would require mitigative measures.</p> <p>Approximately 6.7 acres of toe ditch wetlands will be backfilled in the identified priority areas. Using the WRAP summary scores for these wetlands, it was calculated that 4.0 habitat units of mitigation credits are required. The Corps has approximately 27 mitigation bank credits from planting of wetland trees and removal of exotics (<i>Melaleuca</i>), see Section 4.11 Mitigation. Therefore there is no net mitigation requirement for the proposed actions, and a credit of <math>(27.32 - 3.8) = 23.52</math> HU was generated.</p>
WATER QUALITY	<p>The No Action Alternative would have moderate effects on existing water quality due to increased sediments in the surface waters nearest a breach.</p>	<p>Implementation of Alternative No. 5 is expected to have temporary minimal impacts on the water quality along Reach 1. Construction activities could result in increased sediment load in the nearby surface waters of toe swales of the dike. However, silt screens and other erosion and turbidity control devices will be used, as well as the implementation of Best Management Practices (BMPs) to minimize the discharge of water containing excessive turbidity.</p>

ENVIRONMENTAL FACTOR	NO ACTION ALT	ALT NO. 5 (PREFERRED ALT)
HISTORIC PROPERTIES	Potential significant adverse effects in event of dike failure.	SHPO consultation on Reach 1 was initiated August 20, 1999. In the August 7, 2005 response, the SHPO concurred with the Corps' no adverse effect determination on Reach 1. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places.
RECREATION	Moderate adverse impacts to recreation resources would be anticipated without major repairs to the dike. Piping and boils would continue, requiring emergency repairs to attempt to keep up with the frequency of breaches in the dike. Areas affected would be closed off during construction for safety purposes, with the inclusion of possibly damaged areas awaiting repairs.	Temporary/short-term impacts to parks, bank fishing, and bike trail, access to select lake side locations as a result of construction activities and/or access of construction site, equipment, and staging areas. Specifically, some effects to the paved Lake Okeechobee Scenic Trail (LOST) atop the HHD may occur during project construction. Construction activities may limit access to certain parts of the trail, and parts or the trail may be removed. The Contractor will be required to replace trail elements disturbed, if any, during cut-off wall emplacement. Coordination with FDEP on the Florida Natural Scenic Trail (FNST) would be conducted prior to and during construction.



ENVIRONMENTAL FACTOR	NO ACTION ALT	ALT NO. 5 (PREFERRED ALT)
AESTHETICS	Impacts to aesthetics in the short term are anticipated as piping and boils ruin the integrity of the dike and patches and temporary emergency construction to these areas are ongoing. If these conditions continue without full scale repairs to the dike, aesthetics and safety would be compromised as emergency repairs continue to try and keep up with frequency, construction is continuing, portions of the dike are closed from access, and dust and noise around active construction areas are continual.	Temporary/Short-term impacts to localized areas as a result of construction. Possible vegetation & tree removal.
SOCIO-ECONOMICS	Flooding may result in loss of property and life.	The cutoff wall would affect the upper aquifer by reducing the seepage gradient and may lower the groundwater table near the toe of the dike; however, the impact to adjacent local farms will be insignificant. Possible beneficial impacts may affect the local economy due to construction.
ENERGY REQUIREMENTS AND CONSERVATION	Field office manual labor and construction equipment fuel, to mitigate seepage from piping and boils with sand bagging and other fill material. Filling of sink holes.	Fuel for the construction machinery.
PUBLIC HEALTH AND SAFETY	Decreased factor of safety (F.S.) at critical areas of dike, increased risk of a breach or failure leading to loss of life and property. Risk involved with mitigating seepage from piping and boils with sand bagging and other fill material.	Increased public health and safety, no adverse impacts to public health and safety.

### 4.3 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

#### Lake Okeechobee Operations

The repair and rehabilitation of the Reaches together will affect the manageability of Lake Okeechobee. Once the dike is repaired, lake levels can fluctuate without jeopardizing the stability of the dike or the persons who live, farm or work adjacent to the dike.

#### Fish and Wildlife

Fish and wildlife resources, vegetation, and threatened and endangered species are not cumulatively anticipated to change as a result of any alternative.

#### Water Supply

This project and future work on additional Reaches of the dike are delineated to separate drainage regions. The cumulative impacts of further improvements stand to be positive rather than negative, increasing the stability and safety of the HHD system, and enhancing water resource capabilities to meet all existing needs.

#### **4.4 IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES**

Significant Federal funding would be irretrievably expended during the implementation of Alternative No. 5. In terms of natural resources, impacts are small and limited to the HHD footprint. The commitment of small, low quality wetland areas landward of the HHD (i.e. toe ditch) is irreversible, but would be offset by mitigation. Long-term displacement of some wading bird habitat is probably not a reversible action but is not significant in quantity compared to higher-quality wetlands surrounding the Lake in its littoral zone, along other canals and in the region.

#### **4.5 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS**

Unavoidable adverse effects that would result from implementation of this alternative are expected to be minimal to moderate in severity. A summary of unavoidable negative impacts follows.

##### Topography, Geology and Soils

No significant adverse impacts to the topography, geology, and soils are likely to occur due to implementation of the preferred alternative. Minimal impacts to soils as a result of excavation and filling are expected.

##### Water Resources

Minimal adverse impacts to the hydrology, water supply, water quality and water management are expected to occur as a result of implementing the preferred alternative.

##### Vegetation and Cover Types

No significant adverse impacts to the vegetation and cover types are likely to occur due to implementation of the preferred alternative. Minimal short-term impacts to vegetation as a result of construction and minor excavation for this alternative are expected. Minimal effects would occur only within the HHD footprint.

##### Wetlands

Some unavoidable permanent and direct adverse impacts to wetlands are likely to occur due to implementation of the preferred alternative. Excavation and fill of low quality wetlands will be required along the landward toe of the dike in order to accommodate construction of the proposed toe ditch repairs and seepage berm. Negative consequences should be minimal to moderate and have previously been compensated for by creation of wetland habitat through off-site mitigation (see Section 4.11 – Mitigation).

##### Fish and Wildlife

Non-significant adverse effects to fish and wildlife are likely to occur due to implementation of the preferred alternative. The foraging habitat for wading birds in the landward toe ditches would be altered through implementation of this alternative. Additionally, existing reptiles, amphibians, and fishes utilizing these ditches would be lost during this activity. This is a moderate loss, but considering the low quality of these ditches as foraging habitat, and the availability of an extensive network of comparable ditches in the area, not significant in extent.

### Threatened and Endangered Species

Minor unavoidable adverse impacts to threatened and endangered species are likely to occur due to implementation of the preferred alternative. The foraging habitat for listed wading birds (e.g. wood storks, tri-colored heron, little blue heron) in the landward remnant wetlands would be excavated and filled through implementation of this alternative requiring these animals to forage elsewhere. The severity of this loss is minimal to moderate considering the low quality of these ditches as foraging habitat, and the availability of an extensive network of comparable ditches, as well as Lake Okeechobee littoral zone, in the area.

Determined that the project may affect but is not likely to adversely affect the wood stork, bald eagle, caracara or indigo snake.

### Noise

Minor localized noise related impacts during construction operations are expected to occur due to implementation of the preferred alternative.

### Air Quality

Minor and localized air quality impacts during construction operations are expected to occur due to implementation of the preferred alternative.

### Land Use

Some unavoidable adverse impacts to existing land use elements are likely to occur due to implementation of the preferred alternative. Alteration of local hydrology could affect local agriculturists if the availability of irrigation water is affected. Temporary relocation of electrical transmission lines may be required to conduct construction activities associated with this alternative. Portions of priority areas P-1 and P-6 and the seepage berm will require more land area than the current HHD easement provides, unavoidable impacts to homes, businesses, roads, and railroads will be address in the next NEPA document for alternatives not within the existing ROW for Reaches 1-3.

### Aesthetic Resources

Limited, short-term adverse impacts associated with construction activities would be imposed on aesthetic resources within the project area. These impacts may be mitigated by implementation of a well planned aesthetic measures plan which would account for unavoidable tree and native vegetation removal and dust from earth moving equipment among others. These impacts would be expected to be temporarily adverse at or near to parks, natural areas, residential or urban areas.

### Recreation Resources

Limited but significant, short-term and long-term adverse impacts associated with construction activities would be imposed on recreation resources within the project area. These impacts may be mitigated by implementation of a well planned recreation measures plan which would account for the cost of pavement resurfacing at parks and other areas used for staging and equipment access, tree replacement, and park amenity replacement, rehabilitation, or repair. An inventory of park amenities and utilities prior to construction would facilitate a rapid return to pre-construction state for those areas so impacted. However, the Corps does not have authority for

this project to make repairs to such areas as LOST that would be removed or impacted with construction. These areas could be impacted long term.

#### **4.6 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY**

The adverse effects (short-term uses) associated with implementing the selected alternative action would not be significant with the exception of wetlands, recreational and aesthetic impacts during construction. Adverse effects on wetlands have been fully mitigated by action described in **Section 4.11 Mitigation**.

The environmental impacts of this effort are insignificant in terms of the human environment, and the costs to the natural environment. The purpose of the repair is long-term public safety resulting in a positive net benefit to human and environmental quality both locally and regionally from implementation of Alternative No. 5.

#### **4.7 INDIRECT EFFECTS**

Indirect effects may be caused by implementation of the preferred alternative. Local residents and farmers adjacent to Reach 1 may experience water supply and drainage impacts. The Corps is currently coordinating with the surrounding drainage districts and SFWMD to determine how the toe ditch is operated and anticipate any adverse effects that may result from the backfilling of the toe ditch.

#### **4.8 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES**

The objectives for this project are enhanced local flood control and public safety for property owners and residents close to the referenced Reaches.

#### **4.9 CONFLICTS AND CONTROVERSY**

There are no foreseen conflicts or controversies at this time.

#### **4.10 ENVIRONMENTAL COMMITMENTS**

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

(1) The Corps will conduct a pre-construction survey to determine actual locations of bald eagle nests within the immediate vicinity of Reach 1 prior to issuance of any construction contracts. Results will be coordinated with the USFWS, Vero Beach office.

(2) Standard protection measures (standard environmental specifications to be followed by construction personnel) regarding the Eastern indigo snake will be followed during construction. These specifications have been developed for all projects by the Corps in collaboration with the

US Fish and Wildlife Service, and include hiring a snake monitor during construction, removal of any animals accidentally discovered and other measures to protect individual snakes.

(3) The Corps will conduct a survey for burrowing owls commensurate with that for bald eagle nests prior to issuance of any construction permits. The Corps will consult with the Florida Fish and Wildlife Conservation Commission (FFWCC) regarding adopting standardized protection measures should any owls be identified within Reach 1. Results will be coordinated with the USFWS and FFWCC.

If burrowing owls are found to be present in the project area, impacts will be minimized by altering construction schedules to avoid the nesting season and/or burrows will be cordoned off to avoid their direct destruction.

(4) Continued recreation planning will be performed during detailed project engineering and design. In addition, the appropriate FDEP representative will be contacted to insure collaboration on design features with the Scenic Trail Master Plan Coordination and the Lake Okeechobee Scenic Trail. An inventory of park amenities and utilities prior to construction would facilitate a rapid return to pre-construction state for those areas so impacted.

During construction, access to certain parts of the Lake Okeechobee Scenic Trail (LOST) would be restricted, and parts of the trail would be removed. Following construction, access to the trail by the public would be restored. However, the Corps is not authorized to restore the paved surface of the scenic trail following construction. Coordination with FDEP would be conducted prior to and during construction.

(5) Construction crews will be made aware of the potential for the presence of the Okeechobee gourd. If the gourd is found, the Service will be notified.

(6) The project will require a water quality certification under Chapter 373, F.S. and Sections 402 and 404 of the Clean Water Act. A permit application is underway.

(7) Turbidity screening and diversion will be used to control impacts to the drainage ditches and connected canals. Runoff from the construction site or from storms will be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, and by any measures required by area wide plans approved under paragraph 208 of the Clean Water Act. Temporary and permanent erosion and sedimentation control features or screening will be installed. Temporary velocity dissipation devices will be placed along drainage courses so as to provide for non-erosive flows. Temporary erosion and sediment control measures such as berms, dikes, drains, sediment traps, sedimentation basins, grassing, mulching, baled hay or straw, and silt fences will be maintained until permanent drainage and erosion control facilities are completed and operative. For silt fences, the filter fabric is to be of nylon, polyester, propylene, or ethylene yarn of at least 50 lb/in strength and able to withstand a flow rate of at least 0.3 gal/ft sq/minute. It also would contain ultraviolet ray inhibitors and stabilizers and be a minimum of 36 inches in width.

In addition, during construction, the Corps or Contractor will be responsible to keep construction activities, including refueling and maintenance sites, under surveillance, management, and control to avoid pollution of surface, ground waters, and wetlands. All operations will be controlled to minimize turbidity and would conform to all water quality standards as prescribed by Chapter 62-302, State of Florida, Department of Environmental Protection.

#### 4.11 MITIGATION

The preferred alternative is similar to the alternative recommended in the draft EIS of July 1999. The design called for a seepage berm which would have required backfilling the toe ditch wetlands. As part of their concurrence with the draft EIS, the U.S. Fish and Wildlife Service (USFWS) recommended in the Coordination Act Report (CAR) that the Corps provide mitigation for the backfilling of Reach 1 wetlands by restoration of degraded wetlands. The Corps concurred with the mitigation recommendations and carried out eight acres of wetlands grading and tree planting (located adjacent to Reach 4). Melaleuca, Brazilian pepper and Australian pine trees were all treated and removed in this area between 2000 and 2004 (**Figure 4-1** and **Figure 4-2**). Native wetland trees including cypress, red maple, and pond apple were planted along the toe of HHD from Old Sportsman's Village to just north of the Marina located at Moore Haven in June of 2004 (**Figure 4-3**, **Figure 4-4**, **Figure 4-5**, and **Figure 4-6**). The Uniform Mitigation Assessment Method (UMAM) was used to assess the value of habitat created. The tree planting resulted in 1 credit of mitigation. The Corps has also removed 57 acres of Melaleuca adjacent to Reach 2 (near the Alvin Ward Boat Ramp) and maintained this area. The UMAM scored the habitat value as equivalent to 26.32 credits. The worksheets and calculations used for these analyses can be referenced in Appendix C of this EA.

This previously created mitigation can be used towards the proposed priority toe ditch fills. Biologists from the Corps and the USFWS prepared a Wetlands Rapid Assessment Procedure (WRAP) field analysis of the existing wetland function in the Reach 1 to estimate the required acres of wetland mitigation needed to compensate for filling the toe ditch. The total mitigation required for priority fixes within the existing ROW is estimated at 3.8 acres. Details on how this was calculated are in Appendix C (Table C-1). Table 4-2 displays the available mitigation credits after deducting the mitigation required for backfilling the priority toe ditches within the existing ROW from the mitigation credits created.

**TABLE 4-2: MITIGATION CREDITS AVAILABLE**

Total Mitigation Credits Created	Mitigation Required for Priority Toe Ditch Backfilling	Mitigation Credits Available
27.32	3.8	23.52



**FIGURE 4-1: PRE-MITIGATION CONDITIONS AT SPORTSMAN'S COVE. FROM C-5A STRUCTURE LOOKING EAST (NOTE: MELALEUCA)**



**FIGURE 4-2: PRE-PROJECT CONDITIONS AT SPORTSMAN'S COVE LOOKING EAST FROM HHD (NORTH OF C-5A STRUCTURE.)**





**FIGURE 4-3: POST-WETLANDS RESTORATION - SPORTSMAN'S COVE AT C-5A, PLANTING DONE AT WATER'S EDGE. (7-2-2004)**



**FIGURE 4-4: PLANTING OF WETLAND VEGETATION ALONG HHD BORROW CANAL BETWEEN S-77 AND SPORTSMAN'S COVE. (6-25-2005)**



**FIGURE 4-5: PLANTING OF WETLAND VEGETATION ALONG HHD BORROW CANAL BETWEEN S-77 AND SPORTSMAN'S COVE. (6-25-2005)**



**FIGURE 4-6: PLANTING OF WETLAND VEGETATION ALONG HHD BORROW CANAL BETWEEN S-77 AND SPORTSMAN'S COVE. (6-25-2005)**

## **4.12 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS**

### **4.12.1 National Environmental Policy Act of 1969**

Environmental information on the project has been compiled and this Environmental Assessment was prepared in compliance with the National Environmental Policy Act.

### **4.12.2 Endangered Species Act of 1973**

Consultation was initiated by email with USFWS on 27 September 2006, and will be completed upon coordination of the present Environmental Assessment.

### **4.12.3 Fish and Wildlife Coordination Act of 1958**

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS).

### **4.12.4 National Historic Preservation Act of 1966 (Inter Alia)**

PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order (11593) Archival research, and consultation with the Florida State Historic Preservation Officer (SHPO), has been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. SHPO consultation on Reach 1 was initiated August 20, 1999. In August 7 2005, response, the SHPO concurred with the Corps' no adverse effect determination on Reach 1. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. Consultation for Reaches 2 and 3 is ongoing. The project is in compliance with each of these Federal laws.

### **4.12.5 Clean Water Act of 1972**

Under the Clean Water Act (CWA) the Corps has applied for a State Water Quality Permit (Section 404) as required. We expect to receive the permit (DEP permit [#number] prior to construction start-up, and will delay construction until it is received. We will comply with all applicable Florida water quality standards. A Section 404(b) evaluation is included in this report as Appendix A.

### **4.12.6 Clean Air Act of 1972**

This project has been coordinated with the Florida Department of Environmental Protection (FDEP), Air Quality Division.

No air quality permits would be required for this project. Per the EPA list, there are no air sheds Florida that require source control or monitoring. Coordination with the EPA will be ongoing as detailed design information becomes available. This project is in full compliance with the Act.



**4.12.7 Coastal Zone Management Act of 1972**

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in the FEIS report (dated July 2005) as Annex D. State consistency review was performed during the coordination of the draft and final EIS. The Corps has determined that the proposed project is consistent with the Florida Coastal Zone Management Program and expects State of Florida concurrence.

**4.12.8 Farmland Protection Policy Act of 1981**

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

**4.12.9 Wild and Scenic River Act of 1968**

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

**4.12.10 Estuary Protection Act of 1968**

No designated estuary would be affected by project activities. This act is not applicable.

**4.12.11 Federal Water Project Recreation Act**

The effects of the proposed action on outdoor recreation have been considered and are presented in the Supplemental and Final EIS. Short-term impacts to the Lake Okeechobee Scenic Trail located on top of the dike will require close coordination with FDOT and FDEP in order to return the trail to as-built conditions and limit trail closure time. Continued recreation planning will be performed during detailed project engineering and design. The project is in full compliance.

**4.12.12 Migratory Bird Treaty Act and Migratory Bird Conservation Act**

No migratory birds would be affected by project activities. The project is in compliance with these acts.

**4.12.13 E.O. 11990, Protection of Wetlands**

The recommended plan entails permanent filling of the landward toe ditch, a man-made, yet functional wetland of moderate to poor functional value. A drainage swale will be constructed along the landward toe of the berm to collect and convey surface drainage from each side of the seepage berm. In anticipation of the wetlands toe ditch fill as part of the preferred alternative No. 3 of the draft 1999 EIS, mitigation was initiated by planting of wetland trees (i.e. cypress, red maple, and pond apple) on eight to ten acres of land where exotics had been removed (i.e. Melaleuca, Brazilian pepper, and Australian pine trees). The value of this mitigation credit is estimated at 4 or 5 habitat units. The total mitigation required for the toe ditch priority area backfills is estimated at 4.0 habitat units. The Corps also removed 57 acres of Melaleuca at a site

near Alvin Ward Boat Ramp, equivalent to 26.32 habitat units of mitigation credit that could be applied to this project. Therefore, this project is in compliance with the goals of this Executive Order.

#### **4.12.14 E.O. 11988, Flood Plain Management**

The study is in full compliance. While the considered alternative has no impact on avoidance of development in the flood plain, the recommended plan will directly support a reduction in hazards and risks associated with floods and will minimize the impact of floods on human safety, health and welfare. The recommended plan will have no impact on the restoration and preservation of the natural and beneficial values of the base flood plain.

#### **4.12.15 E.O. 12898, Environmental Justice**

Executive Order 12898 requires the Federal government to review the effects of their programs and actions on minorities and low income communities. The study area is known to contain a significant percentage of low income and minority individuals. The preferred alternative that was formulated for the Herbert Hoover Dike would help to ensure the safety of those communities within the study area (e.g. Belle Glade and Pahokee) as well as residents living within the area anticipated to be impacted in the event of a project failure. In addition to ensuring the safety and well being of residents and their property, implementation of the recommended plan may have a significant beneficial effect on local communities through job creation, increased sale of construction material and other goods necessary to sustain a large construction force for the duration of the project.

#### **4.12.16 E.O. 13112, INVASIVE SPECIES**

Exotic and invasive plant species lost within drainage swales, connecting canals, wetlands, and some uplands within the project area. However, the project will not contribute to nutrient loading, or otherwise foster the spread of invasive species. In addition, some removal of invasive species will be necessary, and maintained, within the toe ditch swale. Exotic wildlife species are not anticipated to be affected. This project is in full compliance with the Act.

## 5.0 LIST OF PREPARERS

### 5.1 PREPARERS

The following individuals listed were responsible for contributing to the preparation, review and technical editing of the Draft EA:

**TABLE 5-1: LIST OF EA PREPARERS**

<b>Name</b>	<b>Affiliation</b>	<b>Discipline/Expertise</b>	<b>Role in Preparing Document</b>
Tien Ho	EPJV, USACE Contractor	Biological Engineer	Preparation of draft EA
Jacob Davis	USACE	Geotechnical Engineer	Preparation of the MRR
Mark D. Shafer	USACE	Environmental Engineer	Water Quality, HTRW, and Permit acquisition

### 5.2 REVIEWERS

**TABLE 5-2: LIST OF EA REVIEWERS**

<b>Name</b>	<b>Affiliation</b>	<b>Discipline/Expertise</b>	<b>Role in Preparing Document</b>
Brooks Moore	USACE	Office of Counsel, Attorney	Legal Review
Pauline Smith	USACE	Project Manager	Review of Project Features
Barbara Cintron	USACE	Chief of Environmental Branch, South Florida Section	NEPA Review
John Bretz	EPJV, USACE Contractor	Project Manager	Review for consistency
Nancy Allen	USACE	Biologist	NEPA Review

## **6.0 PUBLIC INVOLVEMENT**

### **6.1 SCOPING AND DRAFT EA**

Following the completion of the Independent Technical Review (ITR) a news release describing the design recommendations for the rehabilitation of HHD was released on October 5, 2006 to keep the public informed of the decisions resulting from the workshop.

The draft EA and proposed Finding of No Significant Impact (FONSI) were made available to the public by notice of availability dated 07 December 2006.

### **6.2 AGENCY COORDINATION**

The draft EA will be provided to all supporting agencies for review. Any comments received will be addressed in the final EA. Pertinent correspondence with agencies is available in Appendix D of this EA.

### **6.3 LIST OF RECIPIENTS**

The draft EA was sent to the following agencies listed in mailing list below. A notice of availability (NOA) was sent to all other supporting agencies listed. The draft EA was made available in the Glades, Hendry, and Palm Beach County libraries and posted on the Corps environmental planning website at:

<http://planning.saj.usace.army.mil/envdocs/envdocsb.htm>

## **6.4 COMMENTS RECEIVED AND RESPONSE**



## REFERENCES

Herbert Hoover Dike, Major Rehabilitation Evaluation Report, dated November 2000.

Herbert Hoover Dike, Major Rehabilitation Evaluation Report, Reach One, Draft and Final Environmental Impact Statement, March and July 2005.

## INDEX

## —A—

AGENCY COORDINATION, 47  
 agriculture, 6  
 Air Quality, 43  
 Alternative, 6  
 Alternatives, 25  
 ALTERNATIVES, 6  
 Alternatives Considered, iii  
     No Action Alternative, 6  
 American alligator, 27  
 apple snail, 28  
 aquifer, 8

## —B—

bald eagle, 27, 37  
 Belle Glade, 2, 45  
 Birds, 44  
 burrowing owl, 38

## —C—

Clean Water Act, 5  
 Coordination, 43  
 CUMULATIVE IMPACTS, 34  
 cutoff wall, 8

## —D—

DECISIONS TO BE MADE, 5  
 drainage, 7

## —E—

EA, 44, 47  
eastern indigo snake, 27  
 Eastern indigo snake, 37  
 Endangered, 43  
 Environmental Assessment, 5, 43  
 ENVIRONMENTAL COMMITMENTS, 37  
everglade snail kite, 28

## —F—

Federal, 44  
 Fish and Wildlife, 43  
 Flood Control Act of 1948, vi, 1  
 flood protection, 1, 4  
 Florida East Coast Railroad, 26  
 foraging, vii, 26, 28, 30, 31, 35

## —G—

Geology, 35  
 Glades County, 2  
 groundwater, 8

## —H—

Hendry County, 2  
 Hydrology, 29

## —I—

INDIRECT EFFECTS, 37

## —L—

Lake Okeechobee Scenic Trail, 32, 44  
Land Use, 36  
 LIST OF PREPARERS, 46  
 LIST OF REVIEWERS, 46  
 LOCAL SHORT-TERM USES AND  
     MAINTENANCE/ENHANCEMENT OF  
     LONG-TERM PRODUCTIVITY, 37

## —M—

Martin County, 2  
 MITIGATION, 39

## —N—

National Environmental Policy Act, 43  
 navigation, 4

## —O—

Okeechobee County, 2  
 Okeechobee gourd, 29, 38

## —P—

Pahokee, 45  
 Palm Beach County, 2  
 PERMITS, LICENSES, AND  
     ENTITLEMENTS, 5  
 PROJECT LOCATION, 2  
 PROJECT NEED OR OPPORTUNITY, 3  
 PUBLIC INVOLVEMENT, 47

## —R—

Recreation, 44  
 RELATED ENVIRONMENTAL  
     DOCUMENTS, 5  
 relief trench, 9  
 River and Harbor Act, 1

## —S—

Scenic Trail Master Plan, 38  
 Section 404, 43  
 seepage, vi, 1  
 soils, 6, 35  
 South Florida Water Management District, 5  
 St. Lucie Canal, 2  
 stability berm, 7, 8

State, 44

**—T—**

Topography, 35

**—U—**

U.S. Fish and Wildlife Service, 43

UNAVOIDABLE ADVERSE  
ENVIRONMENTAL EFFECTS, 37

Unique, 44

USFWS, 37

**—V—**

vegetation and cover types, 35

**—W—**

wading birds, vii, 26, 35

water quality certification, 38

water supply, 4

west indian manatee, 29

wetland, 26, 31

wildlife, 30

wood stork, 28

This page intentionally left blank.

---

**HERBERT HOOVER DIKE MAJOR REHABILITATION  
HENDRY, GLADES, AND PALM BEACH COUNTIES**

**DRAFT ENVIRONMENTAL ASSESSMENT  
AND  
PROPOSED FINDING OF NO SIGNIFICANT IMPACT**

**APPENDICES**

**MODIFIED DESIGN IN REACH 1  
AND  
PRIORITY TOE DITCH REPAIRS IN REACHES 1, 2, AND 3**

This page intentionally left blank.

**APPENDIX A**  
**404(b) EVALUATION**

This page intentionally left blank.



## SECTION 404(b) EVALUATION

### HERBERT HOOVER DIKE MAJOR REHABILITATION PRIORITY TOE DITCH REPAIRS – REACHES 1, 2 AND 3 HENDRY AND PALM BEACH COUNTIES

#### I. Project Description

a. Location. The existing HHD system is approximately 143 miles (230 km) long, and comprises five counties: Glades, Hendry, Martin, Okeechobee, and Palm Beach. It is divided into eight segments or “Reaches” for planning purposes. The southeastern segment, Reach 1, is the focus of the present study. Reach 1 is an approximately 22.4 miles (36 km) long segment of the HHD located along the southeast portion of the lake. This segment extends from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade (see Error! Reference source not found. of the EA).

b. General Description. The proposed project includes a landside seepage berm and cutoff wall to provide protection at the toe of the dike, to increase stability, and reduce seepage. Since the seepage berm is relatively easy to construct, reliable, and a separable element it can be implemented immediately in the most critical areas of the dike where adequate space is available. At the conceptual level, the seepage berm will extend approximately 150 ft from the toe of the dike. This EA is evaluating environmental effects of the seepage berm within the existing ROW. A future EIS will be produced to assess the effects of the seepage berm outside the existing ROW. A drainage swale would also be constructed along the landward toe of the berm to collect and convey surface drainage from each side of the seepage berm. An impermeable cut-off wall will be implemented at the crest of the dike and extend approximately 10 feet below the first limestone layer. The cut off wall will provide resiliency against seepage caused by piping and groundwater flow. The width of the wall will be 2 feet. The cut-off wall material will be decided after the plans and specifications are prepared (see Error! Reference source not found.).

c. Authority and Purpose. The Flood Control Act (Act), approved by Congress on 30 June 1948, authorized the first phase of a comprehensive plan to provide flood protection and other water control benefits in central and south Florida. The Act included measures for improving control of Lake Okeechobee by constructing or modifying the spillways and other structures, and enlarging the Lake Okeechobee levees to provide the intended flood protection, water storage and water supply. Levee seepage and stability have a direct effect on the capability of the levee to provide the authorized protection. The authorization for levee repairs and modifications of the Flood Control Act of 1948 justify the proposed renovation to the HHD.

The general goal of the HHD MRR is to provide a reliable embankment system around Lake Okeechobee to contain the lake waters for flood protection, water supply, and navigation. An unreliable embankment system, such as that which currently exists along the HHD, could allow for a failure of the system to contain lake waters. Such a failure could result in loss of life,

property, and habitat. A reasonable and effective rehabilitative effort is required to eliminate this possibility.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Material from the levee will need to be excavated prior to installation of the cutoff wall and seepage berm. This material is composed primarily of fill material for the HHD from the excavation of lake rim canal and contains a mixture of sand, silts and clays with varying content of organic materials. The proposed seepage berm will be composed of select granular materials, primarily limestone or quartz, gravel and sand sized particles. The material of the cutoff wall will be determined during the detailed design after the preparation of the plans and specifications.

(2) Quantity of Material. The material needed to backfill the identified priority areas is approximately 15,544 cubic yards of sand and 67,280 cubic yards of # 2 grade rock (3/4" stone and larger). The quantity of material needed for the seepage berm within the existing ROW and the cut-off wall will be determined during detailed design.

(3) Source of Material. No definitive source of borrow material has been identified. A commercially licensed source of quarry material that produces ASPM standard gradations will be identified.

e. Description of the Proposed Discharge Site.

(1) Location. See **Figure 1.1** of the EA.

(2) Size. The priority discharge sites total an approximate 20,000 feet of toe ditch. The partial seepage berm (within existing ROW) and cut-off wall will extend along approximately 22 miles of landward HHD slope and HHD toe.

(3) Type of Site. The project site is an upland embankment composed primarily of fill material and vegetated by mixed grasses. The embankment toe is bordered by a toe ditch throughout most of Reach 1. The toe ditch contains mostly invasive or exotic vegetation, but provides wetland habitat. Agricultural fields and residential development are adjacent to the HHD.

(4) Type of Habitat. The habitat consists of upland grasslands, invasive brush, inundated toe ditches, and residential back yard areas.

(5) Timing and Duration of Dredging. No dredging is specified for this work.

f. Description of Disposal Method. Disposal method will be determined as necessary for construction of each project element.

II. Factual Determinations

a. Physical Substrate Determinations (consider items in sections 230.11(a) and 230.20 Substrate)

(1) Substrate Elevation and Slope. At the conceptual level the cutoff wall will be excavated 34 NGVD to -20 elevation. The HHD landward toe ranges in elevation from 12 to 14 feet NGVD of 1929. The fill areas are at the base of the back toe of the landward side of the dike. Specific information regarding topography may be found in Section 3.03 of the FEIS.

(2) Type of Fill Material. The proposed fill for seepage berm will be composed of select granular materials primarily limestone or quartz, gravel and sand sized particles. Cutoff wall will be composed of cementitious slurry.

(3) Dredged/Fill Material Movement. The fill material will be stabilized and should not be subject to erosion.

(4) Physical Effects on Benthos. Benthic organisms may be temporarily displaced during construction activities.

b. Water Circulation. Fluctuation and Salinity Determinations

(1) Water Column Effects. Standing water and soils periodically inundated will be temporarily impacted during construction. Turbidity and erosion will be controlled during and post-construction.

(2) Current Patterns and Circulation. Construction of the seepage berm at the toe ditches should have minimal effect on current hydrologic circulation patterns. Construction of the cutoff wall will have an impact to hydrological patterns within the HHD footprint. Seepage will flow between the bottom edge of the wall and the impervious layer. The underseepage will then be collected in a swale.

(3) Normal Water Level Fluctuations and Salinity Gradients. Surface and ground water levels will not be affected. Salinity levels should not be affected by the proposed project.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. There may be a temporary increase in turbidity levels in the project area during discharge. Turbidity will be short-term and localized and no significant adverse impacts are expected. State standards for turbidity will not be exceeded.

(2) Effects on the Chemical and Physical Properties of the Water Column. There may be temporary impacts to the chemical and physical properties of nearby waters during construction activities. There are no acute or chronic chemical impacts anticipated as a result of construction. An environmental protection plan, prepared during detailed design, will address concerns regarding monitoring of equipment, maintenance and security of fuels, lubricants etc.

(a) Light Penetration. Some decrease in light penetration may occur in the immediate vicinity of the construction area. This effect will be temporary, limited to the immediate area of construction, and will have no adverse impact on the environment.

(b) Dissolved Oxygen. Dissolved oxygen levels will not be altered by this project.

(c) Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens are expected to be released by the project.

(d) Aesthetics. The aesthetic quality of the water in the immediate area of the project may be temporarily affected by turbidity during construction. This will be a short-term and localized condition.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. Fill will replace approximately 22 miles of HHD toe vegetated by mixed up land grasses. An access road will be built on top of berm, eliminating their primary productivity. Primary production within the lake outflows should not be affected.

(b) Suspension/Filter Feeders. An increase in turbidity in the toe ditch could adversely impact burrowing invertebrate filter feeders within and adjacent to the immediate construction area. It is not expected that a short-term, temporary increase in turbidity will have any long-term negative impact on these highly fecund organisms.

(c) Sight Feeders. No significant impacts on these organisms are expected as the majority of sight feeders are highly motile and can move outside the project area.

d. Contaminant Determinations. Material which will be dredged from the proposed borrow site will not introduce, relocate, or increase contaminants at the fill area.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. No adverse impacts on autotrophic or heterotrophic organisms are anticipated.

(2) Effects on Benthos. No adverse impacts benthic organisms are anticipated.

(3) Effects on Nekton. Mostly small forage fish may be temporarily displaced by construction and turbid water. However, no long-term adverse impacts on nekton are anticipated.

(4) Effects on the Aquatic Food Web. No adverse impacts on aquatic organisms is anticipated. There is expected to be a relatively minor temporary effect on the aquatic food web due to construction activities. Wetlands at toe ditch and lake should maintain their functional value.

(5) Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. There are no hardground or coral reef communities located within the proposed project site.

(6) Endangered and Threatened Species. There will be no significant adverse impacts on any threatened or endangered species or on critical habitat of any threatened or endangered species. Refer to Section 4.10 Environmental Commitments of this EA for measures that will be implemented to protect endangered and threatened species.

(7) Other Wildlife. No adverse impacts to small foraging mammals, reptiles, or wading birds, or wildlife in general are expected.

(8) Actions to Minimize Impacts. All practical safeguards will be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area. Specific precautions are discussed in the in the Draft EA under Environmental Commitments.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. The dredged material will not cause unacceptable changes in the mixing zone water quality requirements as specified by the State of Florida's Water Quality Certification permit procedures. No adverse impacts related to depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents are expected from implementation of the project.

(2) Determination of Compliance with Applicable Water Quality Standards. Because of the inert nature of the material to be used as fill, Class III water quality standards will not be violated.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies will be impacted by the implementation of the project.

(b) Recreational and Commercial Fisheries. Recreational and commercial fisheries should not be impacted by the implementation of the project.

(c) Water Related Recreation. Water related recreation in the immediate vicinity of construction will likely be impacted during construction activities. This will be a short-term impact.

(d) Aesthetics. The existing environmental setting may be adversely impacted, particularly at parks and other natural settings. Construction activities will cause a temporary increase in noise and air pollution caused by equipment as well as some temporary increase in turbidity. Some vegetation buffering natural areas or parks may be unavoidably removed during construction. These impacts are not expected to adversely affect the aesthetic resources over the long term and once construction ends, conditions will return to pre-project levels. Trees removed would be replaced.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. State and local parks do exist within the proposed project area and would be temporarily impacted by construction activities as described in (d) above. In addition, certain stretches of the LOST may be damaged or removed by construction activities. These impacts would be minimized and avoided as practicable.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. There will be no cumulative impacts that result in a major impairment of water quality of the existing aquatic ecosystem as a result of the placement of fill at the project site.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There will be no secondary impacts on the aquatic ecosystem as a result of the construction.

### III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. The discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The placement of fill materials for implementation of the proposed project will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. Appropriate steps have been taken to minimize the adverse environmental impact of the proposed action. Turbidity will be monitored so that if levels exceed State water quality standards, the contractor will be required to cease work until conditions return to normal.

g. On the basis of the guidelines, the proposed disposal of dredged material and fill of wetlands are specified as complying with the requirements of these guidelines.

This page intentionally left blank.



**APPENDIX B**

**COASTAL ZONE MANAGEMENT PROGRAM**  
**FEDERAL CONSISTENCY EVALUATION PROCEDURES**

This page intentionally left blank.

**FLORIDA COASTAL ZONE MANAGEMENT PROGRAM  
FEDERAL CONSISTENCY EVALUATION PROCEDURES**

**HERBERT HOOVER DIKE MAJOR REHABILITATION  
REACHES 1, 2 AND 3**

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed work project is not seaward of the mean high water line and would not affect shorelines or shoreline processes.

2. Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed work has been coordinated with the State without objection.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project purpose is to strengthen and protect the existing lake levee system, thereby ensuring adequate flood control for residents of the region. No action may result in conditions which enhance the possibility of a project failure, resulting in an emergency situation and potentially causing significant damage to persons and property. Therefore, this work would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The proposed project is the least destructive to the aforementioned resources of all the action alternatives considered. The existing habitat within the project area is of marginal quality and has largely been developed for agriculture, urban and residential uses. Impacts to wetlands are expected to be mitigated in the area, enhancing the wetlands functional value of inundated quarries.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: At this time it is not known what lands may need to be purchased for completion of the proposed project. Initial indications are that most lands are already within the HHD levee right of way and are therefore in Federal ownership. Any lands that will need to be acquired will be covered under the EIS that will assess the seepage berm not within the existing ROW.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed work may affect Pahokee State Park arboreal resources with removal for construction access (Section 5, pg FEIS-57). Municipal and county parks may be temporarily affected, however these areas would be returned to their pre-construction condition following completion of the project. Portions of the LOST may be impacted or removed from the dike levee. Impacts will be avoided and minimized to the extent practicable throughout construction activities.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). SHPO consultation on Reach 1 was initiated August 20, 1999. In August 7 2005, response, the SHPO concurred with the Corps' no adverse effect determination on Reach 1. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. Consultation for Reaches 2 and 3 is ongoing. The project is in compliance with each of these Federal laws. Historic preservation compliance will be completed to meet all responsibilities under Chapter 267.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: Contribution from the study area to the State's tourism economy would not be compromised by project implementation. Temporary, short-term impacts may be realized during construction due to effects to municipal and county parks and bank fishing areas. These effects are not expected to be significant. The project would be compatible with tourism for this area and could potentially contribute to overall growth and development of the area therefore, would be consistent with the goals of this chapter.

9. Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: The proposed project would not impact the existing public transportation system of the area and therefore, would be consistent with the goals of this chapter.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed HHD Major Rehabilitation project is located completely inland and would have no affect on saltwater resources either directly or indirectly through discharge downstream. The proposed project is therefore not applicable to chapter 370.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The proposed project has been coordinated with the Florida Game and Fresh Water Fish Commission (GFC) without objection. In a letter dated November 12, 1998, the GFC concurred with findings and recommendations of the U.S. Fish and Wildlife Service for fish and wildlife protection as outlined in the draft CAR (see Annex A). The Corps has agreed to comply with these recommendations as outlined in Section 5.00 of the EIS. Therefore, the work would comply with the goals of this chapter.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: The proposed project does not involve the transportation or discharge of pollutants. Environmental protection measures will be enforced during construction to avoid inadvertent spills or other sources of pollution.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: This work does not involve the transportation or discharging of pollutants. Conditions will be placed in the contract to handle any inadvertent spill of pollutants. Therefore, the project would comply with this Act.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This work does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The work does not involve land development as described by this chapter; therefore, this chapter is not applicable.

16. 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The work would not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: A Draft Environmental Assessment has been prepared and will be reviewed by the appropriate resource agencies including the Department of Environmental Protection.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed work is located near to, but would not be expected to adversely impact agricultural lands. Project implementation would include appropriate erosion control plans and measures to ensure compliance.

**APPENDIX C**  
**MITIGATION ASSESSMENT**

This page intentionally left blank.



**MITIGATION ASSESSMENT**

Table C-1 contains the calculations performed to determine the required mitigation for the nine priority areas. The priority areas that require additional ROW will be covered in the next EIS for Reach 1. Therefore, the required mitigation for priority areas within the existing ROW is calculated to be 3.8 acres.

**TABLE C-1: MITIGATION ACRES REQUIRED BASED ON FEBRUARY 2000 WRAP ANALYSIS FOR REACH 1**

Site Name	Location Description	Length of Repair (ft)	Width (ft)	Area (acre)	WRAP Sample Site ID	WRAP Summary Score	Mitigation Credit Required (habitat units)
<b>Reach 1 Sites where Toe Ditch is within Existing ROW</b>							
Priority 0	Sandcut S-352 South for 1-mile	6000	20	2.8	8	0.65	1.8
Priority 5	S-352 North for 1/2 mile	5280	15	1.8	12	0.65	1.2
Priority 7	1/4 mile north of C10 for 500 ft	2640	15	0.9	12	0.65	0.6
Priority 4	Sugar Ramp South 1/2 mile (southern 800 ft)	500	8	0.1	14	0.57	0.1
Priority 1		800	8	0.1	15	0.32	0.0
<b>TOTALS</b>		<b>15220</b>		<b>5.7</b>			<b>3.7</b>
<b>Reach 1 Sites where Additional ROW Must be Acquired Prior to Filling</b>							
Priority 6	Sugar Ramp North 1/4 mile	1600	8	0.3	15	0.32	0.1
Priority 1	Sugar Ramp South 1/2 mile (northern 1900 ft)	1900	8	0.3	15	0.32	0.1
<b>TOTALS</b>		<b>3500</b>		<b>0.6</b>			<b>0.2</b>
<b>Sites in Reach 3 where Toe Ditch is within Existing ROW</b>							
Priority 8	Sugar Ramp North 1/4 mile	600	8	0.1	15	0.32	0.0
Priority 3	Sugar Ramp South 1/2 mile (northern 1900 ft)	1000	8	0.2	15	0.32	0.1
<b>TOTALS</b>		<b>1600</b>		<b>0.3</b>			<b>0.1</b>
<b>GRAND TOTAL</b>		<b>20320</b>		<b>6.7</b>			<b>4.0</b>
Note: Priority Site #2 is not included as it is a borrow pit that will require a different engineering solution.							

**MITIGATION CREDITS**

The Uniform Mitigation Assessment Method (UMAM) was used to score the quality of the habitat created from the wetland tree planting and the Melaleuca removal. The qualitative and quantitative assessments are located below.

**PART I – Qualitative Description**  
(See Section 62-345.400, F.A.C.)

Site/Project Name <u>Herbert Hoover Pike</u>		Application Number		Assessment Area Name or Number <u>Reach 4 &amp; 2</u>	
FLUCCs code		Further classification (optional)		Impact or Mitigation Site? <u>Mitigation</u>	Assessment Area Size <u>8ac + 16ac = 64 acres</u>
Basin/Watershed Name/Number <u>Lake O</u>		Affected Waterbody (Class) <u>III drinking water</u>		Special Classification (i.e. OFW, AP, other local/state/federal designation of importance) <u>federal navigation</u>	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands <u>seepage connection, along Lake O shoreline</u>					
Assessment area description <u>Reach 4 = McTush to Moore Haven (tree planting) 8ac</u> <u>Reach 2 = Melaleuca Removal (1 mi east from west end) 56ac</u>					
Significant nearby features <u>HHO, Lake O scenic trail highway, ag areas, park</u>			Uniqueness (considering the relative rarity in relation to the regional landscape.) <u>N/A</u>		
Functions <u>minimal habitat</u>			Mitigation for previous permit/other historic use <u>N/A</u>		
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found) <u>otter, alligator, turtle, wading birds, dicky birds, fish, aquatic invertebrates</u>			Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) <u>caracaras, burrowing owls, indigo snakes, wood stork, bald eagle</u>		
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): <u>Above list observed in Reach 1</u>					
Additional relevant factors: <u>Hendry &amp; Glades counties</u>					
Assessment conducted by: <u>Corp S Angie Harebner</u>			Assessment date(s): <u>11/7/6</u>		

**PART II – Quantification of Assessment Area (impact or mitigation)**  
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name <i>Reach 4 H+D</i>	Application Number	Assessment Area Name or Number <i>McTush to Haverly Hwy</i>
Impact or Mitigation <i>Mitigation</i>	Assessment conducted by: <i>Angie Hubert</i>	Assessment date: <i>10-31-06</i>

**Scoring Guidance**  
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

<p>.500(6)(a) Location and Landscape Support</p> <p>w/o pres or current      with</p> <p><i>7</i>      <i>8</i></p>	
<p>.500(6)(b) Water Environment (n/a for uplands)</p> <p>w/o pres or current      with</p> <p><i>7</i>      <i>8</i></p>	
<p>.500(6)(c) Community structure</p> <p>1. Vegetation and/or 2. Benthic Community</p> <p>w/o pres or current      with</p> <p><i>7</i>      <i>8</i></p>	

Score = sum of above scores/30 (if uplands, divide by 20)

current or w/o pres      with

*7*      *8*

If preservation as mitigation,

Preservation adjustment factor =

Adjusted mitigation delta =

For impact assessment areas

FL = delta x acres =

Delta = [with-current]

*0.1*

If mitigation

Time lag (t-factor) = *1.07*

Risk factor = *1*

For mitigation assessment areas

RFG = delta/(t-factor x risk) = *.125*



**Mitigation Determination Formulas**  
(See Section 62-345.600(3), F.A.C.)

or each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable)/((t-factor)(risk))

**(a) Mitigation Bank Credit Determination**

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored

Bank Assessment Area	RFG	X	Acres	= Credits
example				
a.a.1	<input type="text" value="125"/>		<input type="text" value="5"/>	<input type="text" value="625"/>
a.a.2	<input type="text"/>		<input type="text"/>	<input type="text"/>
total				<input type="text"/>

**(b) Mitigation needed to offset impacts, when using a mitigation bank**

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assessed in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.

Impact Assessment Area	FL	=	Credits needed
example			
a.a.1	<input type="text"/>		<input type="text"/>
a.a.2	<input type="text"/>		<input type="text"/>
total			<input type="text"/>

**(c) Mitigation needed to offset impacts, when not using a bank**

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	FL	/	RFG	=	Acres of Mitigation
example					
a.a.1	<input type="text"/>		<input type="text"/>		<input type="text"/>
a.a.2	<input type="text"/>		<input type="text"/>		<input type="text"/>
total					<input type="text"/>

**PART II – Quantification of Assessment Area (impact or mitigation)**  
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name <i>Reach 2 HHD</i>	Application Number	Assessment Area Name or Number <i>Metacena Reach</i>
Impact or Mitigation <i>Mitigation</i>	Assessment conducted by: <i>Angie Huchner</i>	Assessment date: <i>10-31-06</i>

**Scoring Guidance**  
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

<p>.500(6)(a) Location and Landscape Support</p> <p>w/o pres or current      with</p> <p><i>4</i>      <i>7</i></p>	
<p>.500(6)(b) Water Environment (n/a for uplands)</p> <p>w/o pres or current      with</p> <p><i>4</i>      <i>7</i></p>	
<p>.500(6)(c) Community structure</p> <p>1. Vegetation and/or 2. Benthic Community</p> <p>w/o pres or current      with</p> <p><i>4</i>      <i>7</i></p>	

Score = sum of above scores/30 (if uplands, divide by 20)

current      with

or w/o pres

*.26*      *.7*

If preservation as mitigation,

Preservation adjustment factor =

Adjusted mitigation delta =

For impact assessment areas

FL = delta x acres =

Delta = [with-current]

*.44*

If mitigation

Time lag (t-factor) = *1.07*

Risk factor = *1*

For mitigation assessment areas

RFG = delta/(t-factor x risk) = *.47*



**Mitigation Determination Formulas**  
(See Section 62-345.600(3), F.A.C.)

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable)/((t-factor)(risk))

**(a) Mitigation Bank Credit Determination**

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored

Bank Assessment Area	RFG	X	Acres	= Credits
example				
a.a.1	47		56	2632
a.a.2				
total				

**(b) Mitigation needed to offset impacts, when using a mitigation bank**

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assessed in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.

Impact Assessment Area	FL	=	Credits needed
example			
a.a.1			
a.a.2			
total			

**(c) Mitigation needed to offset impacts, when not using a bank**

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	FL	/	RFG	=	Acres of Mitigation
example					
a.a.1					
a.a.2					
total					

**Plants Species of UMAM Assessment Areas**  
**Herbert Hoover Dike, Reaches 2 and 3**

alligator flag (*Thalia geniculata*)  
alligatorweed (*Alternanthera philoxeroides*)  
australian pine (*Casuarina equisetifolia*)  
bahia grass (*Paspalum notatum*)  
banana (*Musa* sp.)  
barrcharis (*Baccharis* sp.)  
bladderwort (*Utricularia* sp.)  
brazilian pepper (*Schinus terebinthifolius*)  
broomsedge (*Andropogon* sp.)  
bulrush (*Scirpus* sp.)  
buttonweed (*Diodia virginiana*)  
cabbage palm (*Sabal palmetto*)  
camphorweed (*Pluchea* sp.)  
cattail (*Typha* sp.)  
climb hemvine (*Mikania scandens*)  
common reed (*Phragmites australis*)  
creeping cucumber (*Melothria pendula*)  
dayflower (*Commelina* sp.)  
duck potato (*Sagittaria* sp.)  
duckweed (*Lemna* sp.)  
elderberry (*Sambucus nigra* subsp. *canadensis*)  
elephant ears (*Xanthosoma sagittifolium*)  
golden pothos (*Epipremnum pinnatum*)  
guava (*Psidium* sp.)  
leather fern (*Acrostichum danaeifolium*)  
marshmallow (*Kosteletzkya virginica*)  
napiergrass (*Pennisetum purpureum*)  
papaya (*Carica papaya*)  
pennywort (*Hydrocotyle* sp.)  
pickerelweed (*Pontederia* sp.)  
pond apple (*Annona glabra*)  
pond-cypress (*Taxodium ascendens*)  
primrose willow (*Ludwigia peruviana*)  
punk tree (*Melaleuca quinquenervia*)  
queen palm (*Syagrus romanzoffiana*)  
ragweed (*Ambrosia artemisiifolia*)  
red primrose willow (*Ludwigia repens*)  
royal palm (*Roystonea regia*)  
sawgrass (*Cladium jamaicense*)  
scheffera (*Schefflera* sp.)  
shield fern (*Thelypteris* sp.)  
smartweed (*Polygonum* sp.)  
southern willow (*Salix caroliniana*)  
spatterdock (*Nuphar* sp.)



spikerush (*Eleocharis* sp.)  
strangler fig (*Ficus aurea*)  
sugarcane (*Saccharum officinarum*)  
torpedo grass (*Panicum repens*)  
unknown palm  
water hemlock (*Cicuta maculata* )  
water lettuce (*Pistia stratiotes*)  
white vine (*Sarcostemma clausum*)

This page intentionally left blank.

**APPENDIX D**  
**PERTINENT CORRESPONDENCE**

This page intentionally left blank.



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
South Florida Ecological Services Office  
1339 20<sup>th</sup> Street  
Vero Beach, Florida 32960



November 24, 2006

Stuart J. Appelbaum  
Chief, Planning Division  
U.S. Army Corps of Engineers  
Post Office Box 4970  
Jacksonville, Florida 32232-0019

Dear Mr. Appelbaum:

The Fish and Wildlife Service (Service) has reviewed the additional information submitted by the U.S. Army Corps of Engineers (Corps), dated October 4, 2006, regarding a technical review report on Herbert Hoover Dike (HHD) Major Rehabilitation Project that included recommendations for urgent repairs to Reach 1A. The Corps has suspended construction of the previously selected plan (bench and cutoff wall) and wants to begin the toe ditch repairs quickly, in anticipation of the 2007 rainy season. A review group of Corps' engineers recommended depositing and compacting sand and gravel in the levee toe ditch and building up a berm over the ditch. The purpose of the work is to stabilize the outer toe of HHD and prevent further deterioration. This letter represents the Service's view of the effects of the proposed action in accordance with section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*) and the provisions of the Fish and Wildlife Coordination Act of 1958, as amended (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

### FISH AND WILDLIFE COORDINATION ACT

The proposed modifications are very similar to a component of the alternatives originally considered for HHD repair in the 1999 Draft EIS, and previously addressed in our Final FWCA report dated December 20, 2001, and in our previous supplemental FWCA reports, dated March 4, 2003, and March 8, 2004. Since the Corps had documented the proposed fill in the 1999 draft EIS, and subsequently carried out the mitigation actions for wetlands losses, and the revised design appears to avoid further impacts to wetlands, no additional mitigation will be required. However, if modifications are made to the project design that potentially impact wetland habitat, further evaluation may be required under the FWCA.

### THREATENED AND ENDANGERED SPECIES

The Service concurred on June 9, 1999, with the Corps' determination that the project was "not likely to adversely affect" the threatened bald eagle (*Haliaeetus leucocephalus*) or the threatened eastern indigo snake (*Drymarchon corais couperi*). We must remind you the Corps' proposed measures to avoid adverse effects to the bald eagle and the eastern indigo snake remain in effect.

Our field inspections indicated the consistent presence of a bald eagle along the HHD between Canal Point and Pahokee at about Mile 10, measuring south from Port Mayaca. This was noted in our draft FWCA reports, dated February 11, 2000, and March 8, 2004. The Corps must search





the area for bald eagle nests prior to construction to avoid construction activities that may disrupt nesting. In addition, prior to project construction, the contractor will instruct all personnel associated with the project that endangered species may be present in the area, and the need to avoid harming, harassing, or killing these species and the civil and criminal consequences. Construction activities must be kept under surveillance, management, and control to minimize any interference, disturbance, or impact to these resources.

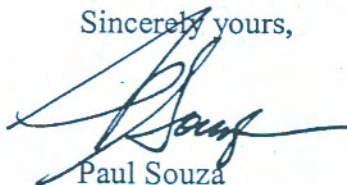
On October 5, 2006 an interagency team composed of Corps staff, an Engineer from the Florida Department of Environmental Protection, Corps contract staff, and a Service biologist conducted an inspection of Reaches 1, 3, and 2 with project engineer Jacob R. Davis. We discussed the subject modifications to the plan now included for urgent repairs to Reach A.

It appears the subject repairs will not further impact wildlife with the exception of temporary impacts associated with construction. We are delighted to see the effort the Corps' project engineer has made to minimize potential impacts on wildlife resources. In addition, we have noticed sensitivity analysis has been performed for Reach A to determine the nature and amount of backfill materials used in these repairs. We continue to encourage Corps' engineering staff to perform this analysis for each identified section to determine the total length of the portion of the toe ditch that needs to be backfilled. The Corps can further limit project cost and also environmental impacts as the project proceeds to detailed design.

Based on our review of the information provided regarding the recommendations for urgent repairs to Reach A and the Corps' continued acceptance of measures to avoid adverse effects to the bald eagle and the eastern indigo snake, we find there is no need to reinitiate consultation at this time. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, if a new species is listed, or if designated critical habitat may be adversely affected by the project, reinitiation of consultation may be necessary.

We greatly appreciate your cooperation in this planning effort and thank you for your support in protecting significant fish and wildlife resources. If you have any questions regarding this project, please contact Agustin P. Valido at 772-562-3909, extension 298.

Sincerely yours,



Paul Souza

Field Supervisor

South Florida Ecological Services Office

cc:

Corps, Jacksonville, Florida (Nancy Allen)  
Corps, Jacksonville, Florida (Jacob R. Davis)  
FWC, West Palm Beach, Florida (Chuck Collins)  
FDEP, West Palm Beach, Florida (Stan Ganthier)  
Service, Jacksonville, Florida (Miles Meyer)

----- Original Message -----

From: "Cintron, Barbara B SAJ"  
[Barbara.B.Cintron@saj02.usace.army.mil]  
Sent: 09/27/2006 02:40 PM  
To: Paul Souza  
Cc: Allen, Nancy P SAJ" <Nancy.P.Allen@saj02.usace.army.mil>  
Subject: Herbert Hoover Dike urgent repairs to Reach 1A

Paul: As Marie pre-briefed you two days ago, the Corps Jacksonville District has received a technical review report on Herbert Hoover Dike that included recommendations for urgent repair to Reach 1A. Recommendations were made by a selected review group of Corps engineers from all over the U.S. Repair actions consist of depositing sand and gravel in the levee toe ditch and building up a berm over the ditch. The Corps has suspended construction of the previously selected plan (bench and cutoff wall) and wants to begin the toe ditch repairs quickly, in anticipation of the 2007 rainy season. The purpose of the work is to stabilize the outer toe of HHD and prevent further deterioration.

The recommended action is very similar to a component of 2 of the 3 alternatives originally considered for HHD repair in the 1999 Draft EIS. The preferred plan described in that EIS (Alt 3) would have impacted wetlands in the toe ditch. A Fish and Wildlife Coordination Act Report was prepared for the 1999 EIS. In it Service biologists recommended off site mitigation for the wetlands fill by restoration of degraded wetlands (leveling and planting with wetland trees). The Corps concurred with the mitigation recommendations, bought the required trees, and carried out 8 acres of wetlands grading and planting. However, the toe ditch was never filled in through the reach: subsequent Corps value engineering studies led to a change in the recommended plan and eliminated the fill work in the toe ditch. The Final HHD EIS, coordinated in 2005, describes a different repair plan, involving construction of a bench in the levee and emplacement of a cut-off wall.

We have prepared a short PowerPoint presentation showing the area of required work, sketches of the fill plan and explanation of the area impacted as well as acreage of the previously built mitigation area. It is attached to this email.

There is no critical habitat for listed endangered species along the outer toe of Herbert Hoover Dike. Listed species that might be observed in the region include wood stork (E); snail kite (E; critical habitat inside HHD in Lake Okeechobee littoral zone), eastern indigo snake, bald eagle, and Audubon's crested caracara. The burrowing owl, a state listed species of special concern, may also be present. Memoranda from the field document that soils in the lower levee toe are frequently saturated with water and do not provide adequate burrowing habitat for burrowing owls or indigo snakes. There are records of one bald eagle nest site adjacent to reach 1, and last year an active

nest of Audubon's Crested Caracara was identified in a commercial nursery adjacent to the Reach 1A work area. This nest was subsequently abandoned by the caracara pair when the chicks failed to fledge.

The Corps is committed to working with the Service and FWC to assure that all standard protective measures for bald eagle, caracara and other significant fish and wildlife resources are implemented along with the proposed action. However, as discussed in the referenced EIS, fish and wildlife habitat in the toe ditch along the affected reach is not of high quality and will be eliminated by the proposed fill. We have already constructed mitigation for the estimated 6.2 acres of fill in the ditch along this reach.

Because we had documented this proposed fill in the 1999 draft EIS, and subsequently carried out the mitigation actions for wetlands losses, we believe that we will not cause any unanticipated adverse effects on the natural environment as a result of the current proposed action.

We'd appreciate your views on the proposed plan. The Powerpoint provides as much information as we have currently on the plan of action. We can also provide photos of the mitigation area. Please share it with your staff and let us know of your concerns. The Corps would like to complete coordination under NEPA by the close of the calendar year so that work can proceed.

Thank you.

Barbara B. Cinron

S. Florida Section Chief, Environmental Branch

Planning Div., Jacksonville District

US Army Corps of Engineers

904-232-1692



From: Hughes, Eric H SAJ  
Sent: Wednesday, October 04, 2006 2:54 PM  
To: harvey.richard@epa.gov; Heinz Mueller  
(mueller.heinz@epamail.epa.gov)  
Cc: Cintron, Barbara B SAJ  
Subject: FW: Scheduling telcon on Herbert Hoover Dike repair changes  
Importance: High

Richard/Heinz:

FYI the e-mail below and the attached Powerpoint file.

WOULD YOU BE AVAILABLE FOR A SHORT (15-30 min) CONFERENCE CALL TOMORROW (Thursday, Oct 5th) WITH BARBARA CINTRON with the JAX COE, to discuss??

HEINZ - Can you do this in the morning tomorrow, Richard says that would work for him. Pick a time.

Barbara - Richard's phone is 561-615-5292 and Heinz's phone is 404-562-9611. I'll be in Baltimore the next 2 days, so I can't participate.

Eric H

---

From: Cintron, Barbara B SAJ  
Sent: Tuesday, October 03, 2006 5:17 PM  
To: Hughes, Eric H SAJ  
Cc: Burns, Marie G SAJ; Ross, Daphne M SAJ; Brooks-Hall, Kimberly SAJ; Allen, Nancy P SAJ; Shafer, Mark D SAJ; McAdams, James J SAJ  
Subject: Scheduling telcon on Herbert Hoover Dike repair changes  
Importance: High

Eric: This Friday the Corps will hold a news conference and release information about the reviews of HHD recently carried out by an independent review team with additional input from the WMD and contractors familiar with the Dike. The Corps has received a consensus of recommendations for repairs and, to make a long story as short as possible, it appears we will return to a plan very similar to the

preferred alternative plan first discussed in the HHD Reach 1 Draft EIS coordinated in 1999. We will need to stabilize the levee toe first by filling the toe ditch and depositing a berm over it.

As we discussed last week, we in Planning would like to go over the proposed repairs and the options for completing NEPA on the most urgent repairs as expeditiously as possible. Last week I told you I would work up a short discussion (as it turned out it's a short Power Point) indicating the area we want to repair most urgently and share with all EPA offices involved our proposed actions. As it happens the project manager and project engineer responded with some illustrations and explanations in Power Point, so we took it from there.

Because Col Grosskruger promised interested parties he would share his plans as soon as possible, and because he plans to announce them publicly on Friday (October 6), I'd like it if we could schedule our first telephone call tomorrow or Thursday of this week. Col. Grosskruger's announcement will be very general, but we want concerned agencies to know more details of what we plan to do prior to the news conference, so that if you receive questions at least you know what we plan to do.

Here is our current version of the powerpoint. It addresses the where, what, wetlands impacts and some up-front mitigation we had done in anticipation of building the 2000 plan, and schedule to begin this work in early 2007.

Do you think we can set this up? I know It's short notice, but I was out sick last Friday and found out about the news release only late yesterday.

Thanks for any help you can give us to coordinate this. We want EPA to be in the loop and welcome your suggestions.

Barb



The photograph on the cover is provided courtesy of Steve Sutterfield.



**US Army Corps  
of Engineers®**

**Jacksonville District**